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Strategies for North Dakota

Enviro Control, Inc, Rockville, MD

Prepared for

Fish and Wildlife Service, Fort Collins, CO Western Energy and Land Use Team

May 78

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This is one of 13 reports that identifies and evaluates the most promising institutional methods for reserving instream flows to benefit fish and wildlife in each of 13 western states. The states included in the study are Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington and Wyoming. Each report has three main sections. First is a guide to help the reader select the most important strategy for any given situation, followed by a summary evaluation of how well the method has worked in the state. The third part is a detailed narrative description of the procedures for implementing the strategy and an example of how it has been employed in the state.

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Biological Services Program

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MAY 1978

INSTREAM FLOW STRATEGIES FOR NORTH DAKOTA

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Fish and Wildlife Service

U.S. Department of the Interior

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The Biological Services Program was established within the U.S. Fish and Wildlife Service to supply scientific information and methodologies on key environmental issues which have an impact fish and wildlife resources and their supporting ecosystems. The mission of the Program is as follows:

1. To strengthen the Fish and Wildlife Service in its role as a primary source of information on natural fish and wildlife resources, particularly with respect to environmental impact assessment.
2. To gather, analyze, and present information that will aid decisionmakers in the identification and resolution of problems associated with major land and water use changes.
3. To provide better ecological information and evaluation for Department of the Interior development programs, such as those relating to energy development.

Information developed by the Biological Services Program is intended for use in the planning and decisionmaking process, to prevent or minimize the impact of development on fish and wildlife. Biological Services research activities and technical assistance services are based on an analysis of the issues, the decisionmakers involved and their information needs, and an evaluation of the state-of-the-art to identify information gaps and determine priorities. This is a strategy to assure that the products produced and disseminated will be timely and useful.

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Water resource analysis, including stream alterations and western water allocation

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FWS/OBS-78/42
May 1978

INSTREAM FLOW STRATEGIES FOR NORTH DAKOTA

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Contract No. 14-16-0008-2121
Western Water Allocation Project

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The opinions, findings, conclusions, or recommendations expressed in this report/product are those of the authors and do not necessarily reflect the views of the Office of Biological Services, Fish and Wildlife Service, U.S. Department of the Interior, nor does mention of trade names or commercial products constitute endorsement or recommendation for use by the Federal Government.

PREFACE

This report represents the combined efforts of several individuals and firms toward a common objective: the identification, description and preliminary evaluation of the most promising strategies (institutional methods) for reserving instream flows for fish and wildlife under existing laws.

Toward this objective, the U.S. Fish and Wildlife Service, through its Western Water Allocation Project, contracted with two firms. Richard Dewsnup and Dallin Jensen received a contract to identify available strategies under state laws, federal laws, interstate compacts, and water quality laws. From a large number of strategies identified by this contract effort, the most promising ones were selected for further evaluation. A second firm, Enviro Control, Inc., was contracted to evaluate the most promising strategies in depth.

The combined efforts of the two firms were published in several reports which are identified below. Following this initial effort, a separate report for each state was published. This was done in the belief that most persons who are involved in instream flow work are primarily oriented to a single state. The several western states are at different levels in terms of their laws supporting instream flows, their water rights traditions, and their past experiences regarding the reservation of instream flows for fish and wildlife. This is one of the individual state reports.

The report is organized into three sections. These are the information matrix, the evalation matrix, and the narrative description of each strategy. The information matrix is intended to be a guide to help the reader select the strategy or stategies most applicable to any particular situation. This matrix contains a general description of the strategy, the most applicable situations for its use, the party or parties who can initiate the strategy, and the party or parties who must implement the strategy.

The evaluation matrix provides a subjective analysis of whether each strategy has been used to advantage, disadvantage, or not at all in each state. A unique feature of the evaluation matrix is that a blank matrix is provided for the reader. This is done because an evaluation of this kind is necessarily a product of a given time frame and a particular point of view. The blank evaluation matrix will allow the reader to evaluate the strategies as times, laws, experiences, and traditions change in the state.

The narrative section of the report contains an expanded description of each strategy, notes its application possibilities, illustrates the usage of the strategy within the state, and evaluates its general utility. All of the narrative materials are oriented to the particular state for which the report is written.

In the use of this report, the reader should be aware of its purposes and limitations. First, only a few of the many possible strategies are described herein. The user should exercise initiative, judgement, and creativity in dealing with any specific situation. Second, this report should be used as a starting point. In any situation related to the acquisition of instream water rights, legal advice should be sought. This report should in no way be construed as a substitute for the opinion of a private attorney, attorney general, or agency solicitor. Third, this report is neither a policy nor decision document. It is simply a collection of strategies which appear to have utility in a variety of situations.

Further questions about these and other strategies may be addressed to the Cooperative Instream Flow Service Group, U.S. Fish and Wildlife Service, Western Energy and Land Use Team, Drake Creekside Building, 2625 Redwing Road, Fort Collins, Colorado 80526. This Group is an interagency, intergovernmental, interdisciplinary service organization under sponsorship of the U.S. Fish and Wildlife Service, Western Energy and Land Use Team. The Group provides a focal point for the increasing activity of instream flow assessments.

For more detail on the strategies, the user of this report should be aware of supportive documentation contained in several related reports:

1. FWS/OBS-77/26. Strategies for Reserving Flows for Fish and Wildlife: Identifcation, Description and Preliminary Evaluation. By Richard L. Dewsnup and Dallin W. Jensen, February 1977. 706 pages.

   This is the full completion report prepared by Dewsnup and Jensen under the FWS contract. It contains chapters on regulatory authority and property rights in water resources, strategies for reserving instream flows under Federal statutes, strategies for protecting instream flows under State statutes, and interstate compacts as they relate to the protection of instream flows. This report is only available from the National Technical Information Service (NTIS Accession No. PB 276 243).

2. FWS/OBS-77/27. State Laws and Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, March 1977. 76 pages.

   This report is a slightly modified version of the State law chapter taken from the above report. It contains a summary matrix in which the legal basis (e.g., statute in the State code) for each strategy in each State will be identified. This report is also available from the National Technical Information Service (NTIS Accession No. PB 272974).

3. FWS/OBS-77/29. Promising Strategies for Reserving Instream Flows. By Richard L. Dewsnup and Dallin W. Jensen, Edward Hoban, Gerald Horak, Martin Lewis, and Wayne Nelson, August 1977. 63 pages.

This report contains descriptions of 26 strategies for reserving instream flows under existing laws. The descriptions provide guidance on the level of action required, legal bases for each strategy, and advantages, disadvantages, and costs involved in strategy implementation. This report is also available from the National Technical Information Service (NTIS Accession No. PB 276 046).

LIST OF ABBREVIATIONS

BLM	Bureau of Land Management
BR	Bureau of Reclamation
CE	Corps of Engineers
DOE	Department of Energy
FERC	Federal Energy Regulatory Commission
FWS	Fish and Wildlife Service
FS	Forest Service
HCRS	Heritage Conservation and Recreation Service
SCS	Soil Conservation Service

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INFORMATION MATRIX

INFORMATION MATRIX

Strategies for Reserving Instream Flows in North Dakota

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
APPROPRIATIVE WATER RIGHTS							
State Condemnation and Reallocation of Water Rights	Condemning a water right to preserve instream flows	Along overappropriated streams	North Dakota Game and Fish Department; public interest groups	Identify streams where the condemnation of a water right can make a significant difference to the fishery; recommend condemnation of water rights to the North Dakota Water Commission	North Dakota Game and Fish Department; North Dakota Water Commission	Condemn water right	Water right cost; bargaining cost
State Appropriation of Instream Flows	Obtaining an administrative appropriation of streamflow from the State water rights agency for fish and wildlife purposes	Primarily along streams not fully appropriated; also, secondarily along overappropriated streams	North Dakota Game and Fish Department; public interest groups	Determine quantity of flow required; request appropriation of instream flow from the North Dakota State Engineer or from the North Dakota Water Commission	North Dakota State Engineer; North Dakota Water Commission	Grant an appropriation	Study cost
State Moratoria on New Appropriations	Obtaining a moratorium on granting of further instream flow appropriations from the State water rights agency for the consideration of fish and wildlife needs	In a rapidly developing river basin	North Dakota Game and Fish Department; other State or local government agency; private individual; public interest groups	Identify river basin where development is rapidly occurring; petition the North Dakota State Engineer or the North Dakota Water Commission to declare a moratorium	North Dakota State Engineer or the North Dakota Water Commission; North Dakota Game and Fish Department	Declare a moratorium; study the river basin and make flow recommendations to be incorporated in basin plan	Bargaining cost; legislative cost; study cost

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Strategies for Reserving Instream Flows in North Dakota

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State Discretionary Water Permit Authority	Utilizing discretionary opportunities by the permit authority for the benefit of instream flows	Granting new water permits or exchanges or transfers of existing rights	North Dakota Game and Fish Department; public interest groups	Petition North Dakota State Engineer to deny or amend permit application	North Dakota State Engineer	Deny or amend permit application	Bargaining cost; study cost
\ LEGISLATIVE AND ADMINISTRATIVE CONTROLS							
Federal Reauthorization of Projects	Reauthorizing existing Federal water resource projects to provide for instream flow reservations	At existing Federal dams or stream diversions	Construction agency; public interest groups; FWS Area Office, (Bismarck); North Dakota Game and Fish Department	Lobby to have construction agency conduct feasibility study; seek Congressional reauthorization	U.S. Congress	Enact legislation reauthorizing the project (approved by Committee, passed by both houses)	Feasibility study cost; bargaining cost; legislative cost
State-Federal Wild and Scenic Rivers System	Designating stream segments for inclusion within a wild and scenic rivers system to promote instream flow reservations	Along free-flowing stream segments, bordered by visually appealing landscape	Local citizens; Member of Congress	Organize and demonstrate local support to convince elected representatives to introduce a Bill	U.S. Congress; Forest Service; Heritage Conservation and Recreation Service; FWS Region 6 Office; North Dakota Game and Fish Department	Pass a Bill authorizing study of the segment(s); conduct study to inventory resource and solicit local views; after agency review, consider study report in Congressional Committee and pass a Bill approving designation	Study cost; legislative cost
State Definition of Navigable Waters	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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Strategies for Reserving Instream Flows in North Dakota

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State-Federal Interagency Consultation	Adopting interagency agreements, regulations, and formal procedures to implement the Fish and Wildlife Coordination Act toward promoting instream flow reservations	Planning new or expanding Federal water resource projects	FWS Region 6 Office; North Dakota Game and Fish Department; public interest groups	Seek interagency agreements based on adopted regulations or procedures; promote strengthening procedures or see that they are enforced	FWS Region 6 Office; North Dakota Game and Fish Department; construction or permit agency	Draw up agreements or make existing procedures more stringent	Bargaining cost
Federal License and Permit Stipulations	Incorporating stipulations in new and renewed Federal licenses and permits to reserve instream flows	Authorizing planned or existing Federal dams and reservoir projects	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups; private citizens	Determine quantity of flow required; make specific instream flow recommendation to permit or license agency	Permit or license agency (FERC, BLM, FS etc.)	Stipulate flow reservation in permit or license	Study cost; bargaining cost
State Allocation of Reservoir Space	Not applicable in this State	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

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Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State Purchase and Lease of Water Rights	Obtaining contractual arrangements which include direct purchase of flow rights, the leasing of water rights, and the purchase of shares in a mutual water company to enhance instream flows	Particularly along overappropriated streams	North Dakota Game and Fish Department; private citizens; public interest groups	Identify stream where the purchase of only a few cfs can make a significant difference to the fishery; locate willing seller, lessor, or mutual share company	North Dakota Game and Fish Department; private citizens; public interest groups	Purchase or lease water right or purchase shares in a mutual share company	Acquisition cost; negotiation cost
WATER RESOURCE PLANNING							
Federal Water Resources Council Planning Program	Considering instream flow needs in Water Resources Council planning programs toward promoting flow reservations	Planning river basin and energy development	North Dakota Game and Fish Department; FWS Cooperative Instream Group; FWS Region 6 Office; public interest groups	Lobby to have instream flows considered in Level B study or § 13(a) assessment	Missouri River Basin Commission	Include instream flow requirements in Level B study or § 13(a) assessment	Study cost
Federal Aid Funding to Purchase Storage	Expending Federal Aid funding to purchase reservoir storage as a means of reserving instream flows	Along overappropriated streams at privately owned reservoirs	North Dakota Game and Fish Department	Identify stream and reservoir; file required documents requesting funds from Region 6 Federal Aid Office	FWS Region 6 Federal Aid Office; North Dakota Game and Fish Department	Grant funds; purchase the water rights	Administrative cost; acquisition cost

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Strategies for Reserving Instream Flows in North Dakota

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
Federal Reservoir Construction and Enlargement	Constructing larger new reservoirs or enlarging existing reservoirs to provide for instream flow reservations	At existing or planned Federal reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Conduct stream investigation; recommend a larger dam and reservoir; allocate additional costs to fish and wildlife benefits	Construction agency; U.S. Congress	After possible Congressional authorization, constructs additional storage for instream flows	Study cost; bargaining cost; construction cost; legislative cost
WATER RESOURCE MANAGEMENT							
State Water Rights Records Analyzed	Analyzing water rights records as an aid to reserving flows	Bargaining for an instream flow	North Dakota Game and Fish Department; FWS Area Office (Bismarck); public interest groups	Determine the extent, location and ownership of water rights from the North Dakota State Engineer	North Dakota Game and Fish Department; FWS Area Office (Bismarck); public interest group	Select the best course of action to reserve an instream flow	Water data cost; study cost
State-Federal Flow Requests Made Early	Presenting recommendations early in the decision process to achieve reservation of instream flows	At planned Federal dams and reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Conduct a timely investigation; recommend an instream flow to the construction agency	Construction agency	Include instream flow in project plans	Study cost; gaging, installation and maintenance cost; bargaining cost

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Strategies for Reserving Instream Flows in North Dakota

Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
State-Federal Flow Requests Made Specific	Specifying and monitoring instream flow reservations to protect downstream fish and wildlife resources	Along stream reaches below existing or planned Federal dams and reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Conduct detailed instream flow study; recommend flow to the construction and/or permit agency, specifying flow releases and flow quantities required at downstream sites	Construction agency/permit agency	Include flow releases in reservoir's operating criteria; install gaging stations to determine the sufficiency of the actual releases	Study cost; gaging installation and maintenance cost; bargaining cost
State-Federal Combined Storage and Flow Requests	Negotiating for reservoir storage to facilitate instream flow reservations	Planning new reservoirs or reallocating storage space in existing Federal reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Request information regarding reservoir storage allocations and projected sales from the construction agency; determine the amount of storage available to ensure minimum instream flows; recommend storage and flow requirements	Construction agency	Allocate storage to fish and wildlife; include flow releases in the reservoir operating criteria	Bargaining costs; study cost

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Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
ENGINEERING ALTERNATIVES							
Coordinated Multi-Reservoir Operations	Coordinating operations of multi-reservoir systems to facilitate instream flow reservations	At Federal dams and reservoirs in multi-reservoir system	FWS Area Office (Bismarck); North Dakota Game and Fish Department; FWS Region 6 Office	Conduct system-wide flow study to establish the flows required; propose to alter the operations manual and memorandum of agreement to ensure the recommended flows	Agency or agencies operating the system; U.S. Congress	After possible Congressional reauthorization or relicensing, revise the system operations manual to include instream flows	Study cost; bargaining cost; legislative cost
Reservoir Sediment Storage Releases	Releasing reservoir sediment storage reserves to promote instream flow reservations	At existing Federal dams and reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Determine the quantity of available yield from the sediment reserve; recommend that the construction or administering agency reassign a portion of this yield to benefit fish and wildlife resources	Construction or administering agency	Modify project operation; release yield from the sediment reserve for instream flows	Study cost; bargaining cost

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Title	IDENTIFICATION		APPLICATION				
			Initiation		Implementation		
	General Description	Applicable Situations	Parties	Actions	Parties	Actions	Expenditures
Stream Channels to Convey Stored Water	Conveying stored water to downstream users via the stream channel to aid in securing instream flow reservations	At planned Federal dams and reservoirs	FWS Area Office (Bismarck); North Dakota Game and Fish Department; public interest groups	Obtain information regarding proposed conveyance systems; determine system's effect on fish and wildlife resources; recommend system modification to the construction agency	Construction agency	Modify conveyance system to preserve fish and wildlife resources	Study cost; re-design cost; bargaining cost

EVALUATION MATRIX

EVALUATION MATRIX Strategies for Reserving Instream Flows in North Dakota

yes = Advantage	●
no = Disadvantage	○
blank - Inapplicable (in this State)	

	ELEMENTS OF EFFECTIVENESS																						ELEMENTS OF COST					
	Overall		Political			Legal					Administrative						Resource					Institutional			Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?
Appropriative Water Rights																												
State Condemnation/Reallocation of Water Rights	○	○	●	●	●	●	○	○	●	○	●	○	●	●	○	○	○	○	○	●	●	○	○	●	●	○	●
State Appropriation of Instream Flow	○	○	●	○	●	○	○	○	●	●	●	●	●	●	●	○	●	○	○	●	●	○	●	●	●	●	●
State Moratoria on New Appropriations	○	○	○	○	●	●	○	●	○	○	○	●	●	●	●	●	○	○	○	○	●	●	○	○	●	●	○
State Discretionary Water Permit Authority	○	○	○	○	●	○	●	○	○	○	●	●	●	●	●	○	○	○	○	○	○	○	○	●	●	●	○
Legislative/Administrative Controls																												
Federal Reauthorization of Projects	○	○	●	○	●	●	○	●	●	●	●	○	○	●	●	○	●	●	●	●	○	○	○	○	●	●	○
State-Federal Wild & Scenic River Systems	○	○	●	○	●	●	○	●	●	●	●	●	●	●	○	○	●	○	●	○	●	○	○	○	●	●	●
State Definition of Navigable Waters																											
State-Federal Interagency Consultation	○	○	●	●	●	●	●	●	●	○	○	●	●	●	○	●	○	○	○	○	○	●	○	●	●	●	●
Federal License & Permit Stipulations	○	○	○	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	○
State Allocation of Reservoir Space																											
State Purchase & Lease of Water Rights	○	○	●	●	●	●	●	○	○	●	●	○	●	●	●	○	●	●	●	●	●	●	●	●	●	○	●
Water Resource Planning																												
Federal WRC Planning Programs	○	○	○	○	○	●	●	●	○	○	●	○	●	●	●	●	○	○	○	○	○	●	○	○	●	●	●
Federal Aid Funding to Purchase Storage	○	○	●	●	○	●	●	○	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	○	●
Federal Reservoir Construction/Enlargement	○	○	●	○	●	●	○	●	○	○	●	●	●	○	●	●	●	●	●	●	○	●	○	○	○	●	●
Water Resource Management																												
State Water Rights Records Analyzed	○	○	●	●	○	●	●	●	○	○	○	○	○	○	●	●	○	○	○	●	●	●	●	●	●	●	●
State-Federal Flow Requests Made Early	○	●	●	○	○	●	●	●	○	○	●	●	●	●	●	●	●	○	●	●	○	●	○	○	●	●	●
State-Federal Flow Requests Made Specific	○	○	●	○	○	●	●	●	○	○	●	●	●	●	●	●	●	○	●	●	●	●	○	○	●	●	●
State-Federal Combined Storage/Flow Requests	○	●	●	○	○	●	●	●	○	○	●	●	●	○	●	●	●	●	●	●	○	●	○	○	●	●	○
Engineering Alternatives																												
Coordinated Multireservoir Operations	●	●	●	○	●	○	●	●	○	○	●	○	○	○	●	○	●	○	●	●	○	●	○	○	●	●	○
Reservoir Sediment Storage Releases	○	●	●	○	●	○	○	●	○	○	●	○	○	○	●	○	○	●	●	●	○	●	○	●	●	●	○
Stream Channels to Convey Stored Water	○	○	●	○	○	○	●	●	○	○	○	○	○	○	●	●	●	○	●	●	●	●	○	○	●	●	●

Answers are strictly judgmental, based on written and verbal opinion reported to the Enviro Control study team through December 1977; subject to modification by selected reviewers (empty matrix furnished for reviewers on the following page).

EVALUATION MATRIX Strategies for Reserving Instream Flows in ___________

yes = Advantage ●
no = Disadvantage ○
blank - Inapplicable (in this State) ☐

	ELEMENTS OF EFFECTIVENESS																							ELEMENTS OF COST					
	Overall		Political			Legal				Administrative						Resource					Institutional			Monetary		
	Demonstrated past utility in this State?	Optimism over future effectiveness in this State?	Predominantly involves fish & wildlife interests?	Can be implemented by fish and wildlife interests?	Attracts support from public interest groups?	Clearly established statutory basis?	Avoids legislative or judicial action?	Recognized without legal challenge?	Legally recognizes fish & wildlife values?	Creates legal right to flow reservation?	Available independent of other strategies?	Fits into a funded agency program?	Involves established administrative procedure?	Uses available fish & wildlife agency expertise?	Uses quantified instream flow needs?	Influences early planning & design decisions?	Directly results in flow reservation?	Results in storage for flow augmentation?	Useful during extended low flows?	Useful for overappropriated streams?	Useful with small streams?	Avoids costly legal process?	Avoids costly bargaining process?	Avoids costly planning & design?	Avoids costly reservoir development?	Avoids costly water rights acquisition?	Avoids costly forfeiture of water revenue?
Appropriative Water Rights																										
State Condemnation/Reallocation of Water Rights																										
State Appropriation of Instream Flow																										
State Moratoria on New Appropriations																										
State Discretionary Water Permit Authority																										
Legislative/Administrative Controls																										
Federal Reauthorization of Projects																										
State-Federal Wild & Scenic River Systems																										
State Definition of Navigable Waters																										
State-Federal Interagency Consultation																										
Federal License & Permit Stipulations																										
State Allocation of Reservoir Space																										
State Purchase & Lease of Water Rights																										
Water Resource Planning																										
Federal WRC Planning Programs																										
Federal Aid Funding to Purchase Storage																										
Federal Reservoir Construction/Enlargement																										
Water Resource Management																										
State Water Rights Records Analyzed																										
State-Federal Flow Requests Made Early																										
State-Federal Flow Requests Made Specific																										
State-Federal Combined Storage/Flow Requests																										
Engineering Alternatives																										
Coordinated Multireservoir Operations																										
Reservoir Sediment Storage Releases																										
Stream Channels to Convey Stored Water																										

APPROPRIATIVE WATER RIGHTS

STATE CONDEMNATION AND REALLOCATION OF WATER RIGHTS

I. Identification

North Dakota Game and Fish Department could utilize this strategy through powers of eminent domain. Eminent domain may be used "to acquire for a public use any property or rights existing when found necessary for the application of water to beneficial uses..." (No. Dak. Cent. Code, § 61-01-04). The use of water for the protection and propogation of fish and wildlife is a recognized beneficial and preferred use.

This strategy is also available to the North Dakota Water Commission. The Commission consists of the governor, commissioner of agriculture and five other members, to be appointed by the governor. No. Dak. Cent. Code, § 61-02-22 provides the Commission with the power and authority to acquire...

> by condemnation in accordance with and subject to the provisions of all laws applicable to the condemnation of property for public use, any lands, rights, water rights of whatever character...deemed necessary or proper for the construction, operation, and maintenance of works....The title to all property purchased, acquired, or condemned shall be taken in the name of the commission and held in trust for, and for the use and benefit of, the people of this state.

All "works" constructed and operated by the Commission may include as its purposes wildlife conservation (No. Dak. Cent. Code, § 61-02-14).

II. Application

The North Dakota Game and Fish Department may elect either to condemn water rights upon its own initiative through the powers of eminent domain or recommend to the State Water Commission that the Commission condemn water rights in order to protect instream flows where a valuable fishery is threatened. For example, either the Department or Water Commission may employ this strategy where a valuable fishery becomes degraded as a result of overappropriation. The decision to condemn a water right, however, must be approached with extreme prudence. The potential benefits of such action must be weighed against the damages including pecuniary cost to the water rights owner and the political costs to the Department and the Commission.

In general, only outstanding fisheries with unique stream attributes should be considered for the application of this strategy. Even in such instances this strategy would not be utilized until all other strategies have been considered and a thorough evaluation is made of the associated damages and costs.

III. Illustration

No example has yet been found where either the Game and Fish Department or the State Water Commission has condemned a water right to preserve fish and wildlife resources.

IV. Evaluation

Neither the Game and Fish Department nor the State Water Commission has utilized this strategy to preserve instream flows. The agencies indicated that this strategy is removed from consideration because of the potential political backlash. Both the Game and Fish Department and the State Water Commission do not consider the comdemnation of water rights as a viable strategy and neither agency intends to implement this strategy in the foreseeable future.

Sources

1. Henegar, Dale, Chief of Fisheries Division, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, January 1978.

2. Sagsveen, Murray, Attorney, North Dakota Water Commission, Bismarck, North Dakota, Private Communication, February 1978.

3. Stuart, Russell W., Commissioner, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, February 1978.

STATE APPROPRIATION OF INSTREAM FLOW

I. Identification

There are no explicit statutory provisions in North Dakota for the appropriation of instream flows. However, No. Dak. Cent. Code § 61-02-30 may be construed to imply that the State Water Commission may appropriate instream flows for the purposes of protecting the aquatic habitat;

> ...the commission may initiate a right to the waters of this state by executing a declaration in writing of the intention to store, divert, or control the unappropriated waters of a particular body, stream, basin, or source...

Presumbly, the acquisition of water rights must be for a beneficial use, which extends to fish and wildlife protection (No. Dak. Cent. Code §§ 61-04-01.1 and 61-04-06.1). The North Dakota Game and Fish Department may, also, file for water rights under the provisions,in the "Appropriation of Water" chapter of the State Water Laws. Appropriation of instream flows might be applied to the maintenance of instream flows to meet fish and wildlife needs.

II. Application

The North Dakota Water Commission, North Dakota Game and Fish Department, or any other interested party might file with the State Engineer for an appropriative right to provide instream flows. With the exception of the Water Commission, the State Engineer might grant permits to applicants in recognition of the use of instream flows for fish and wildlife protection as being a beneficial use. The Water Commission, apparently does not need the approval of the State Engineer in obtaining its water rights, but must only record its rights with the State Engineer.

The Game and Fish Department could appeal to the Water Commission which has extended authority over the appropriation of instream flows. The Commission may prescribe that waters to which it receives rights remain in the stream channel for a specified distance without threat of diversion by any potencial user.

Since the Commission has extended authority over the appropriation of waters, the Game and Fish Department might recommend to the Commission that it appropriate instream flows. In order to enhance the persuasiveness of its recommendations the Game and Fish Department must document the need for such appropriations. This documentation would be greatly reliant upon instream flow studies utilizing such instream flow study methodologies as the Water Surface Profile, Montana Method, Sag Tape Method, and so forth. These studies may incur substantial costs depending upon such factors as stream channel variability, length of the stream segment to be studied, diversions and tributaries affecting the stream flow, and so forth. If the Game and Fish Department applies directly to the State Engineer for a water right the Department should accompany the filing with the results of its instream flow studies to substantiate the need for instream flow appropriations.

III. Illustration

No illustration is available as this strategy has not been implemented in North Dakota.

IV. Evaluation

Appropriation of instream flows to meet fish and wildlife needs has not been utilized in North Dakota. Both the State Water Commission and the Game and Fish Department indicate that this strategy generally would not be effective as most stream flows in the State are intermittent due to adverse climatological and hydrological conditions. Except for a few major mainstem rivers, all streams are either dewatered in the summer or completely frozen in the winter. However, the Game and Fish Department indicates that it may consider appropriating flows if the Garrison Diversion Project is constructed. The project will divert significant quantities of water to the James River and the Sheyenne River. Some of this water may be available for instream flow appropriation. The Departments position may be enhanced by the statutory authority empowering the State Water Commission to prescribe that appropriated waters remain in the stream channel for a specified distance. Otherwise as a result of its perceived limited utility, neither the Water Commission nor the Game and Fish Department are expected to utilize this strategy in the near future. In some areas of the State benefits could be realized by providing sufficient instream flow to maintain or enhance the riparian habitat.

Sources

1. Bovee, Ken, Aquatic Systems Analyst, Fish and Wildlife Service, Fort Collins, Colorado, Private Communication, May 1978.

2. Henegar, Dale, Chief of Fisheries Division, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, January 1978.

3. Sagsveen, Murray, Attorney, North Dakota Water Commission, Bismarck, North Dakota, Private Communication, February 1978.

4. Stuart, Russell W., Commissioner, North Dakota Game and Fish Department Bismarck, North Dakota, Private Communication, February 1978.

STATE MORATORIA ON NEW APPROPRIATIONS

I. Identification

Although not explicitly referenced as a moratorium, the declaration of moratoria on new appropriations seems to be available in North Dakota. No. Dak. Cent. Code. § 61-04-31 does empower the State Engineer upon his own initiation or at the direction of the State Water Commission to:

a. Reserve and set aside water for beneficial utilization in the future; and

b. When sufficient information and data are lacking to allow for the making of sound decisions, withdraw various waters of the state from additional appropriations until such data and information are available.

This strategy provides for the withdrawal of unappropriated waters from further appropriation pending the formulation of policies for the optimal utilization of water resources. The moratorium provides an opportunity to address fish and wildlife needs which are dependent upon the maintenance of instream flows.

II. Application

A moratorium on new appropriations may be made upon either the initiation of the North Dakota State Engineer, direction of the Water Commission, recommendation from the Game and Fish Department, other federal, state, local government agencies, or private organizations. This action would be in recognition of a threat of depletion or degradation of State water resources either on a statewide, river basin or mainstem river basis.

A moratorium provides an opportunity to formulate a plan for optimal utilization of water resources for achieving environmental and developmental purposes. Formulation of this plan requires an analysis of such data as water supply, present and projected water demand by both environmental and developmental interests, and establishment of priorities for the allocation of available water resources among these competing interests. For example, the Game and Fish Department could conduct detailed instream flow studies. The period of time selected for duration of the moratorium should be sufficient to conduct the necessary studies required for selecting a plan to achieve the objectives of the moratorium. In general the cost for such analysis can be expected to be great, but will fluctuate depending upon the level of analysis performed and the geographical scope of the area identified by the moratorium. However, the benefits accruing to fish and wildlife may be substantial.

III. Illustration

No proposals have been made for declaring mortoria on new appropriations in the state, hence, this strategy has not been implemented in North Dakota.

IV. Evaluation

The State Engineer, Water Commission, and Game and Fish Department have not utilized this strategy. The effective application of this strategy for protecting the aquatic habitat is limited to a few major mainstem rivers in the state. All other streams are dry in the summer or completely frozen in the winter. The declaration of a moratorium on certain streams may be effective for preserving riparian habitat that is jeopardized by stream dewatering as a consequence of overappropriation.

If at a latter date the Game and Fish Department decides to recommend a moratorium, the persuasiveness of its recommendations to either the Water Commission or State Engineer would be greatly dependent upon data generated from detailed instream flow studies. These studies will have to demonstrate that the need for a moratorium on new appropriations is imperative for protecting the aquatic habitat. However, the instream flow studies may incur substantial costs.

Sources

1. Bovee, Ken, Aquatic Systems Analyst, Fish and Wildlife Service, Fort Collins, Colorado, Private Communication, May 1978.

2. Henegar, Dale, Chief of Fisheries Division, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, January 1978.

3. Sagsveen, Murray, Attorney, North Dakota Water Commission, Bismarck, North Dakota, Private Communication, February 1978.

4. Stuart, Russell W., Commissioner, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, February 1978.

STATE DISCRETIONARY WATER PERMIT AUTHORITY

I. Identification

This strategy is available to the North Dakota State Engineer for exercising discretionary authority when granting applications for water permits, and the exchange and transfer of water rights between, place, and use. Exercising discretionary authority, the State Engineer may deny or include stipulations in an application for appropriation, thereby ensuring that future appropriations do not threaten minimum instream flows. The State Engineer may, also "...issue a conditional permit for less than the amount of water requested..." (No. Dak. Cent. Code § 61-04-06.2)

Upon filing an application with the State Engineer, the applicant must prepare and publish a public notice containing all essential facts as to the proposed appriopriation (No. Dak. Cent. Code § 61-04-05). After the applicant has given public notice, the State Engineer must then hold a public hearing to determine if the application meets the criteria set forth in No. Dak. Cent. Code § 61-04-06. This criteria includes consideration of the effects on fish and game resources. If the State Engineer determines that an application does not meet the criteria prescribed in section 61-04-06, he shall reject the application (No. Dak. Cent. Code § 61-04-07).

II. Application

This strategy is designed so that fish and wildlife interests petition the State Engineer to recognize instream flow needs on granting permit applications with administrative discretion. The applicable parties to this strategy would be the North Dakota State Engineer, North Dakota Game and Fish Department, and any interested party, especially those parties with prior appropriations, which may be affected by approval of the application. If an objecting party demonstrates to the State Engineer that either granting a permit jeopardizes a prior appropriation, because of an insufficient amount of unappropriated water, or that such action would be contrary to the public interest, then the State Engineer may deny the application or include stipulations in the application.

Objections presented by the Game and Fish Department to the State Engineer in granting an appropriation permit would be based primarily upon the public interest, which encompasses "...the effect on fish and game resources and public recreational opportunities..." (No. Dak. Cent. Code § 61-04-06). The Department must prove that granting a permit threatens the aquatic habitat dependent on the instream flow. This proof would be dependent upon detailed instream flow studies which should predict the adverse affect of further diversions upon the aquatic habitat. Depending upon the level of analysis conducted, these studies may incur considerable costs. Acting upon study findings, the State Engineer might deny the application or include stipulations limiting the amount and period of use of the appropriation. If it is determined that only during low flow periods the appropriation would adversely affect the aquatic habitat,then during these periods the permit may contain stipulations limiting or prohibiting the diversion of water by the appropriator.

III. Illustration

No example could be found where the State Engineer was requested by the North Dakota Game and Fish Department or a public interest group to use administrative discretion to deny or amend an application for a water permit.

IV. Evaluation

The North Dakota State Engineer is empowered by law to either deny or modify a permit for appropriation if it infringes upon a prior appropriative right or is contrary to the public interest. It would probably be the responsibility of the Game and Fish Department to present evidence substantiating its objections in the public interest to the granting of a permit for appropriation. Such evidence would rely upon instream flow studies, which frequently incur considerable expense. The costs associated with instream flow studies contributes to the reluctance of the Game and Fish Department to utilize this strategy. The North Dakota Game and Fish Department believes this strategy to have limited effectiveness in North Dakota, because of adverse climatological and hydrological conditions. These conditions limit the development of self-sustaining fisheries. However, for the few streams which support good fisheries, if properly petitioned by fish and wildlife interests, the State Engineer might either deny or include stipulations in a permit. This action may also be requested by the Game and Fish Department where riparian habitat is being threatened by new diversions.

Sources

1. Bovee, Ken, Aquatic Systems Analyst, Fish and Wildlife Service, Fort Collins, Colorado, Private Communication, May 1978.
2. Henegar, Dale, Chief of Fisheries Division, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, January 1978.
3. Sagsveen, Murray, Attorney, North Dakota Water Commission, Bismarck, North Dakota, Private Communication, February 1978.
4. Stuart, Russell W., Commissioner, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, February 1978.

LEGISLATIVE AND ADMINISTRATIVE CONTROLS

FEDERAL REAUTHORIZATION OF PROJECTS

I. Identification

Reauthorization of a Federal water resource project to provide for increased flow releases so as to reserve instream flows involves Congressional passage of legislation modifying the original authorizing legislation. After the sponsoring construction agency conducts feasibility studies, which include comments of the Fish and Wildlife Service, the appropriate Congressional Committee drafts new legislation or amends the original authorizing legislation. The legal basis of this strategy is the Congressional authorization process for water resource projects and construction agency guidelines and procedures for authorizing and modifying water resource projects.

II. Application

This strategy may be pursued when the reauthorization of a water resource project could rehabilitate or markedly improve the downstream fishery. Interest groups of fishermen or conservationists might instigate this strategy; the Fish and Wildlife Service or North Dakota Game and Fish Department might also. A U. S. Senator or Representative could introduce reauthorizing legislation. Realistically, however, for this strategy to be successful, the construction agency, such as the Bureau of Reclamation or Corps of Engineers, must initiate the process by agreeing to study reauthorization and support it before Congress.

There are a number of important decision points in the formulation and implementation of this strategy. Those encouraging the strategy must decide to lobby the construction agency for action. The construction agency must decide whether to support a study of reauthorization. Once a study is completed, the construction agency may decide to modify the project and, if so, must also decide whether to seek Congressional reauthorization. If the modification is minor, the construction agency has the discretionary authority to alter project operations without Congressional approval. In instances involving instream flows, however, the construction agency would probably seek Congressional approval because of the normally controversial nature of such a modification. To secure the approval of Congress, the construction agency would conduct and submit a feasibility study justifying the proposed change.

Legislation reauthorizing a Bureau of Reclamation project must be approved by the Subcommittee on Water and Power Resources of the House Committee on Interior and Insular Affairs and by the Subcommittee on Public Lands and Resources of the Senate Committee on Energy and Natural Resources. Corps of Engineers projects must be approved by the Subcommittee on Water Resources of the House Public Works Committee and by the Subcommittee on Water Resources of the Senate Committee on Environment and Public Works. After reviewing the feasibility report of the construction agency, these committees must decide whether to reauthorize. According to Congressional staff members, as long as there is no significant political opposition, the committees will approve the reauthorizing legislation. The legislation must then be approved by both houses of Congress and signed by the President.

This strategy is costly in terms of money and time. The construction agency and fish and wildlife agencies must fund and conduct a feasibility study to justify the modification and reauthorization of a project already planned and constructed. The reauthorization process takes almost as long--5 to 10 years--as the original authorizing process.

III. Illustration

This strategy has not, yet, been implemented in North Dakota, therefore, the following example from Wyoming demonstrates the potential utility of this strategy. Kortes Unit, a component of the Missouri River Basin Project in Wyoming, was reauthorized for fishery conservation in 1971 by the passage of P.L. 92-146. Specifically, the Secretary of the Interior was instructed to maintain a minimum streamflow of 500 cfs in the reach of the North Platte River between Kortes Dam and the normal headwaters of Pathfinder Reservoir. However, when water sufficient to operate the unit in this manner is not available, water must be reserved for hydroelectric power peaking operations, and any remaining water will be released for conservation of the fishery resources.

Before construction and operation of Kortes Unit, the stream reach below the dam site contained an excellent trout fishery. However, once Kortes Unit was built, this resource began to deteriorate. Fish kills would frequently occur due to shut-downs of the Kortes hydroelectric plant. Fishermen and area residents were concerned about the destruction of this valuable fishery. Acting upon this concern, the Fish and Wildlife Service and the Wyoming Game and Fish Department convinced the Bureau of Reclamation in 1963 that field studies of various flow regimes should be made. The result of these studies, which were partially funded by the Bureau of Reclamation, was a recommendation to the Bureau that the operation of Kortes power plant be modified to assure a continuous flow of at least 500 cfs between Kortes Dam and Pathfinder Reservoir. In 1964, the Bureau of Reclamation began releasing 500 cfs pending Congressional reauthorization.

In September, 1966, the Bureau of Reclamation completed a special report for the purpose of securing Congressional approval to change the operation of the Kortes Unit from a single-purpose hydroelectric power development to a dual-purpose development with fish and wildlife enhancement as a secondary purpose. The report analyzed the benefits, costs, revenues, and cost allocations with and without the fishery flow. For economic justification, it concluded that the adverse effects at Kortes would be more than offset by the benefits of fishery enhancement. In fact, the benefit-cost ratio increased from 1.31 to 1.36.

In this illustrative situation, important decisions were made by the Fish and Wildlife Service and the Wyoming Game and Fish Department in seeking reauthorization; the Bureau of Reclamation in agreeing to conduct field studies and prepare a report to secure Congressional approval; and the Congressional Committees in supporting the Bureau's position. The fish and game agencies' action was greatly influenced by the great demand for, and little opposition to reauthorization. No economic interest, such as an irrigation district or a municipality, was opposed to reauthorization. The increased benefit-cost ratio from the proposed modification was less important since the project prior to reauthorization was already cost-effective. Although the maintenance of instream flows could result in decreased power production from Kortes Unit, the Bureau of Reclamation could recoup these losses from other hydroelectric projects in the same system. Finally, a positive decision by Congress was assured because of the lack of opposition to reauthorization.

The reauthorization of Kortes Unit took approximately 8 years and incurred substantial cost in time and money among all parties involved. For instance, the Wyoming Game and Fish Department expended between 2 and 3 person-years of effort to conduct its part of the flow studies. These commitments drained some of the limited resources of construction and fish and wildlife agencies. On the positive side, increased flow releases were provided almost immediately after the fish and game agencies completed their study and continued for seven years while project reauthorization was in process. These increased reservoir releases have usually sustained the prescribed minimum flows downstream and restored the downstream fishery.

IV. Evaluation

As shown by the illustration, the strategy of project reauthorization can successfully provide for increased flow releases. For several reasons, however, reauthorization is an unusual occurrence, particularly for fish and wildlife purposes. Once a water resource project is constructed and operating, the fishery interests and the construction agencies have little incentive to incur the expense and time needed to reassess project operations unless a combination of distinctive factors is present. As illustrated by the Kortes Unit reauthorization, the most important factors are the threat to a valuable resource, great demand for project modification, and absence of organized opposition.

Other factors in the successful outcome included increased benefits from reauthorization and the ability to recover the losses caused by changing the use of some water stored in the Kortes reservoir. Because this combination of factors is required for the successful implementation of this strategy, both the North Dakota Game and Fish Department and FWS personnel believe it probably will have limited application in the future. Still, if the right combination of factors does occur, this strategy offers two noteworthy advantages. It provides a long-term solution with a firm legal basis. The reauthorizing legislation legally guarantees the necessary flows in perpetuity or until the legislation is again amended.

Sources

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2. Chartelain, Donald, Staff member, Senate Committee on Environment and Public Works, Washington, D.C., Private Communication, June 1977.

3. Dexter, W. Donald, Assistant Director, Wyoming Game and Fish Department, Cheyenne, Wyoming, Private Communication, June 1977 and December 1977.

4. Eiserman, Fred, Coordinator, Fisheries Management Division, Wyoming Game and Fish Department, Cheyenne, Wyoming, Private Communication, December 1976.

5. Enviro Control, Inc., Strategies for Reserving Instream Flows for Fish and Wildlife; Task 1(b); Unobligated and Unutilized Reservoir Storage at Federally-Controlled Dams, December 1976.

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7. Henegar, Dale, Chief of Fisheries Division, North Dakota Game and Fish Department, Bismarck, North Dakota, Private Communication, February 1978.

8. Simpson, Don, Fish and Wildlife Biologist, Fish and Wildlife Service, Bismarck, North Dakota, Private Communication, February 1978.

9. United States Department of the Interior, Bureau of Reclamation; Cost Allocations Report on the Kortes Unit, Wyoming, September 1966.

10. Zschomler, Stan, Field Supervisor, Fish and Wildlife Service, Bismarck, North Dakota, Private Communication, 1978.

STATE-FEDERAL WILD AND SCENIC RIVERS SYSTEM

I. Identification

The addition of a stream segment to the Federal Wild and Scenic Rivers System, which provides for reservation of flows sufficient to accomplish the purposes of the Act, involves administrative and/or legislative action provided by the National Wild and Scenic River Act (P.L. 94-486). Designation as a wild or scenic river has the effect of reserving historical instream flows since new stream diversions and impoundments are prohibited, and may be restricted below or above the designated river segment. If a river is to be managed entirely or partly by a Federal agency, or if it lies wholly or partly within a National Park, Forest, Wildlife Refuge or other Federal land, an act of Congress is required. The Secretary of Interior can grant a Federal designation if the river is part of a State river protection program. North Dakota enacted the Little Missouri State Scenic River Act, but there are no provisions for extending the act to other rivers in the State. Furthermore, no management plan is apparently being developed for the Little Missouri. The intent of the act was to prevent dam construction on the river, which would have destroyed its present free-flowing character. Therefore, the remainder of this discussion applies to the Federal Wild and Scenic River Act.

II. Application

This strategy can be applied where a free-flowing river or stream segment is at least 25 miles long and bordered by a visually appealing landscape. The Wild and Scenic Rivers Act defines river segments as wild, scenic, and recreational:

> Wild river areas are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic river areas are free of impoundments, with shorelines largely undeveloped, but accessible in places by roads. Recreational river areas are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

The Forest Service and Heritage Conservation and Recreation Service have published clarifying guidelines for determining river segment classfications.

Although the North Dakota Game and Fish Department, the Fish and Wildlife Service, and the HCRS may be able to initiate action by local interests, the local citizens themselves must organize and demonstrate local support to convince their Member(s) of Congress to introduce a bill. Also, the HCRS is conducting a national inventory to determine suitable river segments to recommend to Congress for detailed study.

Congress must pass a bill authorizing a study of the river in question. Such bills must go through the legislative process, including hearings before the House Interior and Insular Affairs Committee and the Senate Energy and Natural Resources Committee. If a study bill passes and is signed by the President, the Forest Service--if the river flows through a National forest, or the HCRS in all other cases -- will work with State and local officials to inventory the river's resources and solicit views of the local landowners and citizens. The study will cost approximately $200,000. If the river proposed meets the criteria, the study team will recommend:

- Classification of various river segments
- Acreage to be included in the river corridor
- Acquisition of land and easements
- Development of recreational facilities
- Assignment of a managing agency

The study report, along with a Draft Environmental Impact Statement and a Draft Management Plan, is reviewed by agencies including the FWS and the State fish and game agency, by the public, and then submitted to Congress and the President. After clearance by the Office of Management and Budget, the President makes a recommendation to Congress. Given sufficient interest, Congress will schedule hearings to discuss the study report. Congress is free to accept all, some or none of the recommendations. If Congress passes a bill which approves the designation(s) and the President signs it, the agency to administer the river segment will prepare detailed boundaries for the river corridor and prepare a Comprehensive Management and Development Plan. Congress must then appropriate money for acquisition of land and easements, construction of visitor facilities, and operating expenses such as salaries of river administrators.

The Congressional designation of a river segment takes several years from the time that Congress authorizes a study. Once a river is declared a study river, it must be designated within 10 years or dropped from consideration. However, the Federal Act protects the river segment under study from the authorization, funding and construction of water resource development projects, as well as restricts development above and below the study segment which would have an adverse effect. The Secretary (Interior or Agriculture) charged with the administration of the river segment would determine if the values for which the river was designated would be adversely affected by development. The Act also protects these rivers for up to three years after the study report is submitted to Congress and the President, regardless of whether or not the river is to be included in the system. All minerals located on Federal lands within one-quarter mile of a study river are withdrawn from prospecting or leasing during the study period.

III. Illustration

This strategy's Federal component has not been implemented in North Dakota, but the following illustration from Montana serves to demonstrate the past utility of this strategy. A 149-mile segment of the Missouri River in north-central Montana from Fort Benton downstream to Robinson Bridge has recently been added to the National Wild and Scenic River System. Seventy-two miles have been designated as a wild river, 28 miles as a scenic river, and 59 miles as a recreational river. This 149-mile segment which provides habitats for bass and catfish is the last major free-flowing reach of the Missouri River.

Dams have been proposed for this segment of the Missouri River since the Corps of Engineers and Bureau of Reclamation formed the Pick-Sloan Plan thirty-five years ago. Proposed projects such as the High Cow Creek Dam and Fort Benton Dam would alter the remaining 149 miles of free-flowing river. Landowners, mainly ranchers, generally have opposed the dams, except for a few who stood to receive irrigation benefits. The ranchers testifying at hearings on the proposed projects indicated that they wanted the area to remain undeveloped.

In 1960, the National Park Service studied the river between Fort Benton and the Fork Peck Reservoir to determine its potential as a National Park. Concurrently, the Corps of Engineers studied the feasibility of constructing dams above Fort Peck. In 1962, the Secretaries of the Interior and Army merged their agencies' efforts and conducted a comprehensive study. The study was completed in June, 1963, and a report was issued which included comments by the FWS and the Montana Department of Fish and Game.

In the mid-1960's, the HCRS studied the Missouri from Coal Banks Landing to Charles M. Russell National Wildlife Refuge. In 1968, the HCRS issued a report recommending establishing that river segment as a "national river" under a pre-existing Federal program which afforded limited protection. That same year, Congress enacted the National Wild and Scenic Rivers Act, which specified the Missouri River from Fort Benton to Ryan Island, Montana as one of the segments to be studied for inclusion in the system. The HCRS conducted additional studies to determine the feasibility of including the Missouri River segment in the National System and published an Environmental Impact Statement in 1975 which the FWS and the Montana Department of Fish and Game reviewed.

At this point, Senator Lee Metcalf of Montana began working for inclusion of the Missouri segment in the National Wild and Scenic Rivers System because of his personal interest in conservation and strong local support from individuals and organizations in central Montana. In the 92nd, 93rd and 94th Congresses, Senator Metcalf introduced bills to include this river segment. At hearings on the bills, overwhelming support for preservation came from 36 national, state and local organizations.

By 1976, the Wild Missouri bill provided for a maximum of 180,000 acres, protecting the canyon rim to rim for all but the first 40 miles, where protection is established from riverbank to riverbank in order to exclude considerable private land from the system. At the request of local landowners, the entire river segment was to be administered by the BLM to allow for existing use such as grazing and water diversion for irrigation. In 1976, the bill was bogged down in the House. After it was amended to provide for water pumping facilities on the river for future agricultural and recreational purposes, it was finally passed by both houses and signed by the President on October 13, 1976.

A detailed Management Plan is currently being developed by the BLM in cooperation with State and other Federal agencies. The plan will be available in early 1978. To date, the designated segment of the Missouri has been preserved as a free flowing river.

Study costs for this segment of the Missouri have been several hundred thousand dollars. The personnel time expended in this effort has been enormous although the benefits of designation are great as well. The lengthy process to include the Missouri River segment under the National Wild and Scenic Rivers Act accounts for this extraordinary effort.

IV. Evaluation

As of early 1978, no river in North Dakota has been proposed as a study river for possible inclusion into the Federal Wild and Scenic River System. Therefore, the FWS and the North Dakota Game and Fish Department have not had an opportunity to utilize this strategy. The Game and Fish Department was not involved in the State efforts to designate the Little Missouri as "Scenic." Future designation of another North Dakota river as "wild and scenic" is remote as no other river in the State has the unique attributes possessed by the Little Missouri.

The designation of a river or stream segment under the National Wild and scenic Rivers Act (Section 13 Part C) tends to reserve flows in quantities sufficient to accomplish the purposes of the Act. The Act prohibits new water resource development in the designated segment and restricts water resource development upstream and downstream which would adversely affect the designated river segment. It is a serious shortcoming, however, to take this approach to reserving flows without actually quantifying the streamflow regime that underlies the wild or scenic river designation, and monitoring the flows to ensure their maintenance, possibly by augmenting deficient flows with reservoir releases upstream from designated segments. The Act does not prohibit existing water users along a designated river segment from continuing their use; it only prohibits new appropriations. In fact. the Act states that any taking by the United States of a water right which is vested under either State or Federal law at the time a river is included in the national system shall entitled the owner to just compensation.

Inclusion in the system also protects the river segment from Federally funded water resource development. Therefore, no Federally funded dams and reservoirs will be built on designated river segments. However, this in no way guarantees that sufficient flows will occur to preserve the developed fish and wildlife resources. Some means of linking instream flow needs of fish and wildlife to this process for streamflow protection will be necessary. In 1977 the FWS, in conjunction with western state fish and game agencies, was conducted a study which identified and mapped stream segments having substantial fish and wildlife value. The results from this study may be used by the HCRS when it expands its own study in 1978 to identify additional stream segments for inclusion in the Wild and Scenic Rivers System.

Future effectiveness of this strategy will depend on developing and maintaining local support and be constrained by the substantial costs involved in its implementation. The Congressional approval required to study a river segment and include it in the national system may take several years. Nevertheless, the strategy does provide for a permanent maintenance of historical flows and prohibits future Federal development. Its future effectiveness will hinge most of all on relating streamflow maintenance to quantifiable fish and wildlife values. This quantitative link is not inherent in the National Wild and Scenic River Act, but it may be possible to bridge the gap administratively.

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STATE DEFINITION OF NAVIGABLE WATERS

The nature and extent of the public trust in the navigable waters of the State have not been precisely judicially or legislatively defined in North Dakota, and therefore this strategy for utilizing the public trust doctrine to reserve instream flows is not available.

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STATE-FEDERAL INTERAGENCY CONSULTATIONS

I. Identification

Whenever a Federal agency constructs, modifies, or licenses a reservoir project, it must consult with the Fish and Wildlife Service and the North Dakota Game and Fish Department to obtain and consider their recommendations concerning fish and wildlife resource preservation and development, including the provision of instream flow. Refining and formalizing this consultative process is the goal of this strategy. The formulation and adoption of interagency agreements, construction or permit agency regulations or formal procedures, and strict enforcement of these requirements are tactics available to implement this strategy.

The legal or administrative basis for this strategy is the Fish and Wildlife Coordination Act (FWCA) and the regulations or procedures the Federal construction and permit agencies have developed to implement the Act. The FWCA (P.L. 85-264) passed in 1958, which expanded upon the Act that created the FWS in 1946 (P.L. 79-232). The FWCA requires that full consideration be given to the recommendations of the FWS; the 1946 Act only required consultation between the construction agency and the Federal and State fish and game agencies.

II. Application

The FWS, the North Dakota Game and Fish Department and a private interest group are the parties who would instigate this strategy. At the present time, neither the Bureau of Reclamation, Soil Conservation Service, Forest Service nor Bureau of Land Management has an interagency agreement with the FWS at either the regional or headquarters level to implement the FWCA. The Corps of Engineers has a cooperative agreement with the FWS, enacted in 1954. This agreement will be discussed as an illustration of this strategy. All of these agencies, though, do have formalized procedures to implement the FWCA. In addition, the Corps will soon be issuing regulations concerning their implementation of the FWCA. A review of these procedures and proposed regulations is necessary to assess the decision-making and costs involved in implementing this strategy.

According to the Bureau of Reclamation policy, coordination in all phases of planning should include:

- Early notification by the BR of the initiation of planning studies
- Opportunity for the FWS to participate in the formulation and evaluation of project plans
- Opportunity for the FWS to provide reports to the BR, including recommendations relating to fish and wildlife aspects of plans or proposals.

FWS reports on BR projects are funded by the Bureau. Congress allocates funds to the FWS through the BR's Washington office which disburses funds to the FWS through the Regional Offices. Beginning in 1978, such funds will not be earmarked in the appropriation act and disbursed from Washington, but rather will be transferred at the field level.

Although not referring explicitly to the FWCA, the SCS procedures do specify that Federal and state fish and wildlife agencies be encouraged to participate actively in project planning and to incorporate measures needed in each project to the maximum extent feasible. According to Forest Service procedures,

> . . . it will be the policy of the Forest Service to refer to the Fish and Wildlife Service and/or the appropriate state fish and wildlife agency, all proposed projects which have a potential for affecting fish and wildlife resources to such an extent as to warrant the investigation and recommendations of these agencies.

The BLM's regulations and procedures do not refer to the FWCA, but their new organic act, the Federal Land Policy and Management Act of 1976 (P.L. 94-579), indicates that fish and wildlife values will be considered in granting permits for right-of-way. Conditions to guarantee these values, such as minimum releases from reservoirs to augment instream flows, can be inserted in the permits.

The Corps draft regulations stipulate that the District Engineer, at least every six months, provide the Regional Director of the FWS with information concerning all pre- and post-authorization studies. This information will be helpful to the FWS in making decisions on personnel requirements and preparing investigative schedules. The draft regulations also require the District Engineer to notify the Regional Director of the initiation of any project investigation and coordinate with the FWS throughout the investigation. The District Engineer must consider to the fullest extent practicable the recommendations of the fish and wildlife agencies.

Beginning with FY 1978, funds for the FWCA studies will no longer be budgeted as line items and transferred at the headquarters level. Rather, the District Engineer, after consultation with the FWS Regional Director, will include in his budget the funds necessary for the FWS to comply with the FWCA. The new draft regulations state that local entities must pay for the cost of water released for instream purposes. Also, local entities must furnish assurances that appropriate action will be taken to prevent downstream withdrawals of water that could negate fishery benefits credited to such releases.

In pursuing this strategy, the FWS can seek agency regulations or interagency agreements based on unilaterally adopted procedures, attempt to strengthen present procedures, or see that they are enforced on a project by project basis. If interagency agreements or agency regulations are to be drawn up, or existing procedures made more stringent, the required decision-making would occur at the policy-making level of the FWS, not at the field level. To enforce the existing procedures, however, decision-making must be at the field level.

In terms of personnel, time and money, the costs involved in implementing this strategy could be quite high. They would vary depending on the tactic that is used. Of the several tactics available, enforcing existing procedural requirements would probably incur the highest cost because it involves project by project application, yet this tactic may carry the greatest payoff.

III. Illustration

In 1954, the FWS and Corps of Engineers enacted an interagency agreement to cover the Coordination Act of August 14, 1946 which, when subsequently amended, became the Fish and Wildlife Coordination Act (FWCA) of 1958. This agreement established guidelines for CE consideration of FWS recommendations for fishery preservation in planned water resource projects.

These guidelines stipulated that the District Engineer shall incorporate in a project report all recommendations of the FWS which are satisfactory to him, including, of course, recommended instream flow reservations. The District Engineer must explain in the report his reasons for rejecting those recommendations he found unsatisfactory. Although there is no provision in this interagency agreement for pre-project coordination, the CE is supposed to include fish and wildlife conservation as a project purpose if the effects of a project on fish and wildlife resources would be significant.

This agreement has not had much impact in North Dakota, because until recently the FWS has not made instream flow recommendations in conjunction with CE projects.

IV. Evaluation

It is difficult to determine the utility of this overall strategy. It is first necessary to ascertain what effect the Fish and Wildlife Coordination Act of 1958 has had on reserving instream flows. Strengthening the implementation of the Act through the application of the various tactics covered under this strategy could be expected to increase the probability of flow reservations.

A study performed by Enviro Control of instream flow recommendations made in Arizona, Colorado, Idaho, Montana, New Mexico, Oregon, Utah, Washington and Wyoming indicated that recommended flows after the 1958 amendments (FWCA) were accepted more often than prior to that time. The fishery was maintained or improved more often in the post-1958 projects than in the projects built before that time. However, there are no reliable statistics to gauge the success of flow recommendations in the last few years when procedures have become even more stringent. Although North Dakota was not included in this study, similar results,also, could be expected.

Although the passage of the Fish and Wildlife Coordination Act of 1958 may have helped to reserve instream flows, making this Act more effective is the goal of this overall strategy. Enacting interagency agreements may be a promising tactic. On the other hand, the CE 1954 agreement is the only one presently operative. Construction and permit agencies probably would be unwilling to draw up such rigorous agreements since their own formalized procedures already contain most of the features in such an agreement. A distinct advantage of interagency agreements, in contrast to unilateral agency procedures, is that the FWS would have more of an opportunity to insert provisions it deems necessary. Also, an interagency agreement may imply more commitment on the part of the cooperating agencies. These characteristics, though, may explain why the Federal construction and permit agencies prefer merely formalizing their own procedures.

The strengthening of present procedures, even to the extent of adopting formal regulations which are more binding, may prove a promising tactic. The National Wildlife Federation has filed a petition in 1977 with the Department of the Interior, Department of the Army, and the Council on Environmental Quality to compel Federal construction and operating agencies to adopt formal procedures in reviewing FWS recommendations for mitigating the adverse impact of development upon fish and wildlife habitats. The petition seeks to alleviate the dependency of the FWS on the construction agencies for transfer funds by having mitigative features funded and implemented concurrently with project construction, or in advance of project construction where there may be interference with the achievement of mitigative goals.

The Wildlife Federation is optimistic that the petitioned agencies will draft formal review procedures. However, the agencies are not expected to fully comply with the petition, but they are expected to take significant steps toward the desired end. For instance, the Corps has drafted new procedures and regulations but they will not be formalized until other petitioned agencies complete their drafts. This peition relies upon existing legislation (FWCA) which avoids the pitfall of introducing new legislation into Congress.

Another promising tactic is promoting the enforcement of existing procedures and regulations. The construction and license agencies, having issued these requirements, are officially committed to them. Issued by the agencies' main offices in Washington, D.C., these procedures or regulations are not always adhered to in the field. This may be attirbuted to negligence or mere unfamiliarity on the part of the construction and permit agencies. Also, some FWS Field Offices may be unaware of construction and permit agency procedures.

The major costs involved with the tactics subsumed under this general strategy would result from drafting procedures, regulations or agreements, and attempting to convince the construction or permit agencies to adopt them. The costs, to a large extent, are a function of the cooperation proffered by the agencies solicited.

A major constraint on the effectiveness of this strategy would be the difficulty the FWS would have in determining whether or not the procedural requirements are being honored. FWS knowledge of project planning and development depends on notification by the construction or permit agency. Notification may be delayed until late in the planning phase. Conceivably, the FWS would spend substantial time and effort in trying to be cognizant of project planning programs if it is not properly notified.

Even if proper notification is made, successful implementation of agency procedures for cooperation with fish and wildlife interests is dependent on the availability of funding and personnel. The FWS incurs significant cost when detailed investigations are conducted in the field and subsequent recommendations are formulated for planned projects such as dams and reservoirs. Although the construction agencies transfer funds to the FWS for this purpose, these may not be adequate. Hopefully, this situation may improve, at least as it involves the BR and CE, because of the new funding procedure that the Bureau and Corps will initiate in fiscal year 1978. Transfers of General Investigation funds will be made at the regional level following negotiations of appropriate amounts with the respective FWS Regions. These transfers will be made by memoranda of agreement executed by the affected agency field offices. This new communication at the field level could result in greater funding.

Another constraint upon the effectiveness of this strategy is the lack of an enforcement mechanism. If a field office of a permit or construction agency does not conform with its own procedures or an interagency agreement, the FWS can take no action other than lodging a complaint with the offending agency. The pending adoption of CE regulations is a step in the right direction because the regulations will have the force of law. Concerning the Forest Service and BLM, regulations to be issued in accordance with the Federal Land Policy and Management Act of 1976 (P.L. 94-579) may also afford further protection to fish and wildlife. However, in final analysis, the applicability of this strategy will be limited for the foreseeable future, because no significant water resource projects are proposed for North Dakota.

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FEDERAL LICENSE AND PERMIT STIPULATIONS

I. Identification

The inclusion of a minimum flow stipulation in a dam and reservoir project license or permit ensures that flows will be required to be released as a matter of legal right. To ensure that minimum flows are legally required as an integral part of project operations, it is essential that fish and wildlife interests take an active part in the licensing or permit process involved with an application for use of land and water under Federal ownership or control.

The legal basis for this strategy in relation to Forest Service and BLM-controlled lands derives from the Federal Land Policy and Management Act of 1976 (P.L. 94-579). Conversations with the FS and BLM have pointed out that, until pending regulations are issued pursuant to P.L. 94-579, the permit process for these agencies will continue to maintain vestiges of previous legislation which regulated acquisition of Federal lands. The legal basis with regard to the Federal Energy Regulatory Commission derives from the regulatory authority of the FERC over the non-Federal hydroelectric industry. As a quasi-judicial commission of the Department of Energy, it licenses construction, operation and maintenance of dam and reservoir projects utilizing waters and lands of the United States under mandates of the Federal Power Act of 1920 and other Federal laws.

II. Application

This strategy may be utilized when it is determined that a minimum instream flow is needed downstream from a proposed reservoir project requiring a permit or license or subject to relicensing. Participating parties in this strategy would be the Federal agency in control of the affected land and water resources, the project permittee or licensee and an interested party advocating fish and wildlife interests such as the FWS or North Dakota Game and Fish Department. In the case of a FERC-regulated project, any person or group of persons whose participation may be in the public interest could participate.

The permit process followed by both the Forest Service and BLM are similar. This discussion will focus on this process as it relates to the Forest Service. Presently, the critical point at which fish and wildlife interests may exert pressure for instream flow stipulations in the project permit occurs after the applicant has submitted a plan of construction, operation, and rehabilitation of the proposed right-of-way in National Forests. At this time, an impact survey is performed by the FS which must contain the "views of the Fish and Wildlife Service. . . and State fish and game departments where fishery and wildlife values are of importance. The Forest Supervisor will ask the Fish and Wildlife Service and State fish and game departments for a report." At this point the interested fish and game agency should submit its minimum flow recommendations and any studies documenting the efficacy of the suggested flow regime in providing for fish and wildlife habitats.

Upon receiving the plans of the applicant and reviewing the completed impact survey, the FS determines whether the land in question can accommodate the proposed use. If an affirmative determination is made, a permit is granted. Permits normally contain a list of terms and conditions. Section 505 of P.L. 94-579 states that one of the purposes of the terms and conditions is to minimize damage to scenic and aesthetic values and fish and wildlife habitats, and to otherwise protect the environment. Upon granting the permit with accompanying terms and conditions, the applicant must submit detailed plans of construction to the FS. If these plans comply with requirements of the permit, construction may then proceed.

Within this process, it is important that the interested fish and wildlife agency make a specific instream flow recommendation to the Forest Supervisor when asked to comment on potential project impact. Such action will ensure that a minimum instream flow will be considered for inclusion in the final project permit as part of the terms and conditions of project operations. Furthermore, to ensure the strategy's success, the North Dakota Game and Fish Department endeavors to have instream flow stipulations included in the State's water storage permit, thereby providing for State enforcement of the FS permit.

In the FERC licensing process, there are two critical points at which proponents of this strategy may exert influence. The first point occurs during the applicants' preparation of the Application for License of which Exhibit S is a component. Exhibit S, as described in 18.CFR 4.41, Rules of Practice and Procedure requires that:

> The Applicant shall prepare this exhibit on the basis of studies made after consultation and in cooperation with the U.S. Fish and Wildlife Service, Department of the Interior and appropriate state fish and wildlife agencies. . . The exhibit shall include a statement on the nature and extent of applicants' consultation and cooperation with the above agencies.

It is thus essential that fish and wildlife interests make a concerted and organized contribution to this process involving Exhibit S at an early stage in project planning to sensitize the applicant to the importance of instream flow needs and guarantee coverage of this issue in the application review.

The second point at which fish and wildlife advocates may apply their influence occurs after the Application for License is submitted to the FERC. Upon its receipt, the FERC reviews the application to determine whether or not it fulfills the requirements of Rules of Practice and Procedure. Public notice of application is then given, specifying a final date for filing protests, notices of intervention or petitions to intervene. Concurrent with this notification, copies of the completed application are disseminated to Federal agencies, state agencies and other interested parties for comment and review.

Upon review of the application and determination that instream flow needs are not adequately provided for, an interested party can petition the FERC to intervene in the applicant's licensing. It is essential that such petitions be made before the final date specified by the Commission; otherwise, the petitions may be rejected as "untimely". Section 1.8d of Rules of Practice and Procedure does state that "in extraordinary circumstances for good cause shown, the Commission (may authorize) a late filing." In the event that a petitioner's right to intervene is granted, a hearing is scheduled to resolve the difference. However, prior to the hearing, it often happens that the applicant and the petitioner meet informally and resolve the issue.

Prior to scheduling a hearing, the FERC is also empowered to authorize a Technical Session in which FERC staff meets with the interested party and the applicant in order to clarify the issue, and if possible, resolve it. If resolution is not accomplished in either an informal meeting between the applicant and the intervenor or in the Technical Session, a pre-hearing conference is arranged by the FERC's Office of General Counsel. At this time, the issue is further defined and another attempt is made at resolution. Finally, if the issue is still unresolved, a hearing is scheduled before an Administrative Law Judge of the FERC. Both parties present their case and a decision is made and transmitted to the Commission. This final hearing decision is not binding on the decision of the five-man Commission; however, the decision of the Commission is usually in agreement with hearing findings.

The term of license for most FERC projects is 50 years. The process followed for relicensing of projects is identical to the process discussed previously except that an Exhibit S is not required.

In connection with the Forest Service or BLM permit process, the costs associated with this strategy are limited to those incurred during preparation of the fish and wildlife input to the impact survey. The magnitude of the instream flow study and time associated with preparing the report submitted to the permit agency as part of this input would be the principal cost determinants.

For FERC-licensed projects, the costs linked with this strategy are directly dependent on the extent of agreement between the intervenor and the applicant. Expenditures of time and money increase as negotiations advance through the informal meeting stage to the FERC hearing stage. Occasionally, instream flow studies must be performed to provide data for a decision. The studies are authorized at an informal level or as a result of a FERC hearing. The funding for these studies is normally supplied by the utility company applicant. Most likely the studies would be performed by the North Dakota Game and Fish Department in cooperation with the staff biologist for the utility company.

III. Illustration

This strategy has not been implemented in North Dakota, therefore, an example from Montana serves to demonstrate this strategy's utility. On 5 October 1976 the then Federal Power Commission granted a license renewal to the Montana Power Company to operate its Mystic Lake Project. The new license will expire in 2009. The project is located on West Rosebud Creek, a tributary of the Stillwater River in Custer National Forest. The license stipulates that until a permanent schedule of minimum flows is established Montana Power must provide for a 10-cfs minimum flow of water during June, July, and August, and a 2-cfs minimum flow during the remainder of the year. Between the dam and the power plant located approximately 2 miles downstream exists a good fishery of rainbow and brown trout. Apparently this stipulation has been complied with.

These instream flow provisions were included in the license on the basis of recommendations from the FWS and the Montana Department of Fish and Game. These provisions are subject to modification subsequent to a detailed 2-year flow study, funded by Montana Power Company, to have been completed in 1978. However, until such modification, the 10 cfs flow must be maintained during June, July, and August, and a 2-cfs flow during the remainder of the year as measured at the weir located in the West Rosebud Creek channel immediately upstream of the power house, approximately 2 miles from the dam. The stipulation further specifies that Montana Power is to consult and cooperate with the FWS and the Department of Fish and Game in conducting the Company's instream flow studies. Thus far, the agencies have applied variations of the water surface profile, Montana, and Oregon methods to determine a permanent schedule of releases. Montana Power, also, will employ the methodology being developed by the FWS Cooperative Instream Flow Group. The original 1962 project permit did not contain flow release provisions; therefore, in order to guard against potential dewatering of West Rosebud Creek during drought years, flow release provisions were included in the renewed license. During normal years seepage from the dam and tributary inflow have been adequate to support the present rainbow and brown trout fishery.

IV. Evaluation

Neither the FWS nor the Game and Fish Department has utilized this strategy for reserving instream flows; however, these agencies have submitted recommendations to Federal permitting agencies that minimum reservoir pools be maintained for conservation purposes. Because of climatological and hydrological conditions in North Dakota, most streams are either dry during the summer or frozen during the winter. Therefore, the FWS and Game and Fish Department try to establish reservoir conservation pools where fish have a much greater chance for survival under such severe conditions in lieu of recommending instream flows. Possible future utilization of this strategy in North Dakota would probably be limited in recognition of the need for tradeoffs between establishment of reservoir conservation pools and instream flows, which are more susceptible to the severe hydrological and climatological conditions.

However, the Mystic Lake project illustrates that fish and wildlife agencies may negotiate with a licensing agency to provide for specific flows in the license, which are subject to modification after completion of detailed instream flow studies. This technique provides leverage to persuade the licensing agency to incorporate larger instream flow requirements into the license if detailed studies are unavailable at the time of relicensing.

Despite past success in many other states there have been some constraints on the strategy's effectiveness. Applicants were understandably wary of accepting instream flow recommendations which often were based on very cursory investigations, especially when the guarantee of such flows would increase project costs. Although the licensing or permit process contained requirements for consideration of instream flow needs, the inability of the interested party to develop realistic recommendations resulted in either an omission of instream flow stipulations or inclusion of a clause merely guaranteeing "adequate" or "suitable" flows.

Often a project sponsor will agree to supply minimum flows on an informal, non-contractual basis. Such "gentlemen's agreements" have sometimes been responsible for maintaining fisheries below reservoir projects; however, more often than not, the absence of a compelling legal force guaranteeing minimum reservoir releases results in a sponsor withholding flows during critical periods of competitive user needs. If the license or permit stipulates flow releases, the licensee or permittee is legally obligated to provide them. Most other instream flow strategies do not lead to as strong a legal obligation.

Any future utilization of this strategy will undoubtedly be enhanced as a result of the current research on instream flows needs. Also, further consideration may be given to instream flows in FS and BLM projects with the implementation of the Federal Land Policy and Management Act of 1976 (P.L. 94-579).

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STATE ALLOCATION OF RESERVOIR SPACE

The strategy to obtain reservoir space for fisheries in reservoirs constructed or licensed under State law is not available in North Dakota because no statutory or institutional basis exists for its implementation.

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STATE PURCHASE AND LEASE OF WATER RIGHTS

I. Identification

Contractual arrangements to reserve instream flows include the direct purchase of flow rights, the leasing of water rights, and the purchase of shares in a mutual water company. The legal basis of this strategy lies in the provisions of the No. Dak. Cert. Code. § 61-02-26. This statute implicitly empowers the North Dakota Game and Fish Commission to acquire waters by purchase and lease and to purchase shares in a mutual water company. This authority may be construed to encompass the purchase of both direct flow rights and reservoir storage.

II. Application

The North Dakota Game and Fish Department with the consent of the North Dakota Game and Fish Commission might acquire direct flow rights and reservoir storage by purchase, lease, and the purchase of shares in a mutual water company pursuant to No. Dak. Cert. Code.§ 61-02-26. The North Dakota Game and Fish Department does not have any programs for the purchase or lease, or direct flow rights or reservoir storage to protect instream flows. The acquisition of reservoir storage might be used by the North Dakota Game and Fish Department to provide for reservoir releases to maintain instream flows below a dam. The lease of water rights provides only an interim solution, but could be applied to protect a valuable fishery in a particular stream where no permanent supply of flows is available for purchase. A mutual water company is a corporation usually organized by landowners to acquire water for domestic and agricultural use in a designated area. Each shareholder receives a pro rata amount of water based upon the number of shares owned in the company. To employ this arrangement, a private party or conservation organization would purchase shares in a mutual water company to acquire instream rights and leave their entitled water in the stream.

The major cost of implementing this strategy is, of course, the high price of water rights which has risen dramatically in the last few years and will probably continue to rise in the future. However, the acquired water right might be sold to be exercised at a point downstream where few instream values worth preserving exist, thereby defraying part of the acquisition cost. Other costs include expenditures of personnel and funds for studies to identify streams where a purchase would have the greatest benefit and the substantial effort to negotiate for the purchase.

III. Illustration

This strategy has not been implemented in North Dakota, but the following illustration from Montana serves to demonstrate the past utility of this strategy. In 1977, the Montana Department of Fish and Game entered into an agreement with other governmental entities and private individuals to purchase all water rights on Ashley Lake, located on Ashley Creek, from the Ashley Irrigation District. The water rights included approximately 11,448 acre-feet of useable water storage. The purpose for this contractual arrangement was to continue the flow of Ashley Creek in as nearly a natural flow as possible. The purchase price was to be

$50,000 for the rights, appurtenances and easements. The Department of Fish and Game decided to purchase approximately 8,300 acre-feet for approximately $21,000, because further appropriation of Ashley Creek were not anticipated.

Below the dam Ashley Creek supports a fishery of rainbow and cutthroat trout. In its lower reaches near Flathead Lake the stream contains some perch, sunfish, and bass. Apparently, there is no normal flow pattern known for the stream, therefore, the Department of Fish and Game plans to apportion the stored water in a manner that will produce a flow regime similar to that of other uncontrolled streams in the same area.

This contractual agreement is to be executed in 1978. Although, the effectiveness of this arrangement for protecting the fishery and wildlife habitat on Ashley Creek cannot be determined at present, the Department of Fish and Game is optimistic that this contract will serve to meet the Department's objective.

IV. Evaluation

Contractual arrangements for the enhancement of instream flows have not been used in the past in North Dakota and the Game and Fish Department expects this situation to continue in the future because of significant constraints on applying this technique. First, the cost of purchasing water rights is considered to be prohibitive, although if the water right could be resold downstream, the acquisition cost could be reduced. Second, the Game and Fish Department prefers to establish reservoir fisheries rather than stream fisheries. Flow releases from reservoirs generally would not support a year round, self sustaining fishery, because climatological and hydrological conditions are so extreme that streams are either dry in summer or completely frozen in winter. Therefore, the Department probably could not justify the expenditure of the required funds to purchase reservoir storage for instream flows. These constraints also apply to the lease and purchase of shares in a mutual water company to protect instream flows.

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WATER RESOURCE PLANNING

FEDERAL WATER RESOURCES COUNCIL PLANNING PROGRAMS

I. Identification

Coordination of Water Resources Council (WRC) planning activities performed by a River Basin Commission (RBC) with the planning activities of the member states of the Commission will allow for increased emphasis on instream flow needs on national, regional and State levels. The planning process of the WRC derives from the Water Resources Planning Act of 1965 (Public Law 89-80), which was designed to encourage conservation, development, and use of the nation's water and related land resources on a comprehensive and coordinated basis by Federal, state, and local governments and private enterprise. The Act established the Water Resources Council (Title I), provided for the establishment of River Basin Commissions (Title II), and authorized financial assistance to States for comprehensive water and related land resources planning (Title III). So-called Level B. studies were authorized by Section 209 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500). Under this legislation, the WRC was directed to prepare Level B Plans for all river basins of the United States.

II. Application

Level B studies are designed to resolve complex problems requiring interdisciplinary approaches and interagency inputs. These studies vary widely in scope and detail, focus on middle-term needs (15-25 years), and involve Federal, state and local interests. The findings of these studies are an integral part of the "Comprehensive, Coordinated, Joint Plans" (CCJP's) prepared by the various RBC's. The subject matter of these studies includes energy issues, water quality, land use and other water-related topics such as maintaining instream flows for fish and wildlife.

Just as the RBC is responsible for preparing a CCJP at the regional level, so too are many states responsible for preparing or revising Comprehensive State Water Plans governing future water policy decisions. With increasing frequency, these state plans include a listing of instream flow needs for fish and wildlife. In most cases, a State's participation in Level B planning is small in comparison to its Statewide water use planning efforts. As compared to Level B Plans, State Water Plans are relatively short range. Once authorized, these plans directly influence the policy by which state water rights would be determined. It would be fortuitous, then, if Level B Plans and Comprehensive State Water Plans addressed common topics such as instream flow needs.

A major cost associated with the use of this strategy results from state participation in a Level B planning effort. According to WRC requirements, a State must assume 25% of the total funding cost. Fortunately, the state's share in this cost need not be monetary but may be supplied in the form of in-kind services, such as office space and equipment or project support staff. In addition, costs are incurred by participating agencies in the planning process who fund state fish and game agencies to determine instream flow requirements. The level of Federal funding received by the state fish and game agency is based upon negotiations between the fish and game agency, the FWS, and the River Basin Commission.

III. Illustration

The North Dakota Game and Fish Department was requested to participate in the Yellowstone River Basin Level B study, but did not. However, Montana's experience in the Yellowstone Level B study illustrates the problems and potential of this strategy. In 1976 the Governor of Montana and the Department of Natural Resources and Conservation requested that the Missouri River Basin Commission (MRBC) conduct a Level B study of the Yellowstone River Basin in Wyoming, Montana, North Dakota. The MRBC then enlisted the support of the FWS and, subsequently, the Montana Department of Fish and Game. The purpose of the study was to identify the potential impact of energy development on water resources and, consequently, its impact on irrigation and recreational needs.

The involvement of the Montana Department of Fish and Game entailed the preparation of general wildlife and fishery data based upon field studies, projections of future fish and wildlife resources, and recommendations on instream flow needs. The Department received inadequate funding to conduct its investigations; it devoted approximately one person-year to the preparation of its data and projections.

The final draft of the Level B study is due in early 1978. Although instream flow needs do not constitute a highly significant facet of the study, the Missouri River Basin Commission indicates that instream flow needs will be addressed in the Level B Study in a chapter on water supply.

Much of the FWS effort was devoted to strengthening the consideration of fish and wildlife needs in the study. Also, the FWS stressed the need for instream flows specified at the sub-basin level and was instrumental in coordinating the participation of the three State fish and game agencies.

IV. Evaluation

The WRC was established in 1965. Since that time, states generally have benefited from funding received under Table III of the Water Resources Planning Act. In recent years, RBC planning efforts such as Level B studies have begun to take increased notice of instream flow needs. Continued funding availability under Title III and increased concern for instream flows in Level B studies have combined to enhance the consideration of instream flow requirements in regional and State planning programs.

Since the North Dakota Game and Fish Department and FWS did not participate in this Level B study because of the anticipated problems, the remainder of this evaluation mainly focuses on the Montana FWS and Montana Department of Fish and Game evaluation of their involvement in the Level B study.

The Level B study for the Yellowstone River Basin was not expected to produce new policies or programs for the protection of instream flows. The FWS and the Montana Department of Fish and Game considered this Level B study to have fallen short of its goals because inadequate attention was paid to environmental and instream flow issues. Fish and wildlife interests were inadequately represented resulting in a study oriented toward development issues. Furthermore the Montana Department of Fish and Game indicated that, although it was able to produce a substantial report through departmental and a small amount of Title III funds, it would have benefited greatly from increased Title III funding.

This strategy is promising for formulating instream flow policy in conjunction with development policy. However, the strategy's potential will be realized only when those problems cited earlier are rectified. It is critical that fish and game agencies adhere to the established format of the Level B study strategic plan in order to include instream flow policies in these planning documents.

This strategy provides a means for the study of instream flow needs rather than reserving these flows as part of dam and reservoir project operations. Therefore, it must be used in conjunction with other strategies which can directly achieve flow reservations. Nevertheless, the national and regional exposure accorded to flow requirements as part of thw WRC planning program increases the overall viability of instream flow reservations.

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FEDERAL AID FUNDING TO PURCHASE STORAGE

I. Identification

The Federal Aid in Fish and Wildlife Restoration Programs are supported by a manufacturer's excise tax on certain items of fishing gear, sporting arms and ammunition. These taxes collected by the United States Treasurer are appropriated to the Fish and Wildlife Service which distributes these monies to the states and territories for carrying out the intent of the Federal Aid Programs. Under the Federal Aid in Sport Fish Restoration Act (P.L. 81-681), known as the Dingell-Johnson Act, funds may be appropriated to the States for the purchase of reservoir storage which, ultimately, could be used as a means of reserving instream flows. Other legislation, which combined with the Dingell-Johnson Act forms the legal basis for Federal Aid Programs, includes the Federal Aid in Wildlife Restoration Act, known as the Pitman-Robertson Act (P.L. 75-415), and the Anadromous Fish Conservation Act (P.L. 89-304).

II. Application

This strategy may be utilized when the North Dakota Game and Fish Department determines that the fish and wildlife resources below a reservoir might not be preserved or enhanced except by the purchase of reservoir storage. Parties participating in the implementation of this strategy would be the interested State fish and game agency and the regional FWS Federal Aid office.

The process whereby a state applies for Federal Aid funding is described in the 1973 revision of the Federal Aid Manual. The first document submitted by the state is the Application for Federal Assistance (AFA), which outlines the basic plan for the proposed project. Information pertinent to the environmental and socio-economic impacts of the project as well as budget information and forecasted cash needs are also included in this application. The most important part of the application is the Program Narrative which must address:

- Needs or objectives of the project
- Expected benefits or results
- Approach of the project
- Project location
- Related Federal projects

The AFA in combination with any supporting documents provides the basis for any decision made by the Federal Aid Office. If the proposed project is in accordance with specifications of the Federal Aid Program, a Project Agreement is issued. The Project Agreement outlines the period of agreement between the state and the U.S. government and the respective cost share of each entity during the period of development.

Costs are incurred by the state and Federal governments in the implementation of this strategy. Prior to submitting an AFA, the state must expend funds to determine which streams are in need of increased flows. Additional costs are borne by the State in revising AFA's which the Federal Aid office determines to be incomplete or insufficiently detailed.

III. Illustration

Federal Aid monies have not yet been used in North Dakota to purchase reservoir storage for instream flows, so an example from Utah is cited here to illustrate the utility of this strategy. Long Park Reservoir Project, operated by the Sheep Creek Irrigation Company, will be located on Sheep Creek in the Ashley National Forest within Dagget County, Utah. Sheep Creek is a feeder of Flaming Gorge Reservoir operated by the Bureau of Reclamation. A clearing permit was secured from the Forest Service and elimination of trees from the reservoir site was completed in the spring of 1977. Construction of the reservoir began in October 1977 with an estimated completion date of October 1978. At the present time, the Sheep Creek Irrigation Company acquires water from four high mountain impoundments--Daggett, Tamarack, Jesson and Spirit Creek between the site of the proposed Long Park Reservoir and the backwater of Flaming Gorge Reservoir.

In its upper and middle reaches, Sheep Creek is a narrow stream located in a constricted canyon. In its lowermost three miles, Sheep Creek Canyon expands in its course toward Flaming Gorge Reservoir. This reach sustains the spawning of rainbow and brown trout which emerge from the reservoir in the months of April (rainbow) and October and November (brown). In past years, to secure adequate storage for irrigation needs, the operating schedules of the four high mountain reservoirs stipulated that flows would not be passed in Sheep Creek during the months of spring run-off storage or during the Fall non-irrigation months. Therefore, the spawning of rainbow and brown trout was hindered in the lower 3 to 4 miles of Sheep Creek.

In 1974 , the Utah Division of Wildlife Resources (DWR) was notified that planning had been undertaken by the Sheep Creek Irrigation Division and the Soil Conservation Service for the proposed 13,700 acre-foot Long Park Reservoir. In the Narrative Statement of this application, the DWR made the following proposals:

- Purchase three of the four high-mountain lakes from the irrigation company so that these impoundments could be stabilized
- Purchase a 3,000 acre-foot conservation pool to maintain a trout fishery in the new reservoir
- Purchase 720 acre-feet of water which could be bypassed at the Long Park Reservoir Diversion Dam to enhance the fishery habitat in the lower four miles of Sheep Creek.

According to the agreement between Sheep Creek Irrigation Company and the Division of Wildlife Resources, no water will be diverted from Sheep Creek between December 1 and March 31; however, from the 720 acre-feet of active storage acquired, 4 cfs will be bypassed each spring from the Lower Sheep Creek Diversion Dam for the first 30 days after water from Sheep Creek is diverted to Long Park Reservoir, and 4 cfs will bypass this diversion dam between October 1 and December 1. These releases are intended to enhance the spawning habitat of Lower Sheep Creek. The DWR has also reported that, if these flows result in improved spawning, channel improvement and riparian revegetation will be carried out in this reach.

On June 30, 1976, the FWS issued a Project Agreement wherein funding in the amount of 76% of project costs or $272,790 was supplied to the DWR for the Long Park Reservoir Project. These funds were to be administered in accordance with the Federal Aid in Sport Fish Restoration Act and used for the purchase of water rights in the three high-mountain lakes and Long Park Reservoir and to provide for bypass flows at the diversion to Long Park Reservoir.

As indicated by the two-week "turn-around" time between DWR's submission of the AFA and the issuance of an FWS Project Agreement, an AFA thoroughly prepared in accordance with Federal Aid Manual Instructions will ensure timely processing of an application. The critical points in the decision-making process for this strategy are to be found during the State's preparation of the AFA. The successful acquisition of Federal Aid funding is dependent upon:

- Sufficient documentation of the AFA for the proposed project
- Adequate performance in Federal Aid-funded projects which are in progress

In the case of Long Park Reservoir, the major cost incurred by the State was the 25% share ($90,930) of project costs.

IV. Evaluation

This strategy has not been implemented in North Dakota and the North Dakota Game and Fish Department indicates that it would generally not be effective because reservoir releases would immediately become subject to appropriation by downstream users, thus negating the water's intended uses. It is believed that competition for available reservoir storage results in water cost too great to justify the necessary expenditure of funds. Furthermore the Game and Fish Department is unwilling to expend matching funds to implement this strategy because the potential benefits to fish and wildlife would be minimal. This is due to the fact that climatological and hydrological conditions are so adverse that most streams in the state are susceptible to either dewatering in the summer or are frozen in the winter.

However, if North Dakota changes its present position it must avoid mistakes other states have made which have curtailed its effectiveness. Conversations with officials of the Federal Aid Program indicate that, in the past, delays in project funding have resulted from inadequate documentation of Project Agreements. These agreements between the state and the affected irrigation districts were often vague in delineating post-project responsibilities. Failure by the state to submit reports and vouchers for the previous year's work within the 90-day period specified by Federal Management Circular 74-7 also delayed the processing of an AFA for impending work.

Another impediment to the use of the strategy in other states has been State violation of the Rules and Regulations of the Federal Aid Program (Section 80.5). States become ineligible for Federal Aid funding if funds or real property acquired through this source pass from control of the state fish and game agency or are used for purposes not specified in the Project Agreement. State eligibility is restored when misused funding is compensated or the appropriated property or an equivalent is restored. Adherence to the administrative guidelines of the Federal Aid Programs will improve this strategy's effectiveness.

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FEDERAL RESERVOIR CONSTRUCTION AND ENLARGEMENT

I. Identification

This strategy involves the construction of new dams and reservoirs large enough in capacity to expressly provide for instream flow reservations, or the enlargement of existing dams and reservoirs for this purpose. The legal basis for this strategy is implied in the legislation granting authority to construction agencies to construct and modify reservoir projects. The Bureau of Reclamation derives this power from the Reclamation Act of 1902 and subsequent amendments, especially the important 1939 amendments. The Corps of Engineers is granted authority by the various Rivers and Harbor Acts, and the Soil Conservation Service operates under the Small Watershed Protection Act. More specific statutory authority to provide reservoir storage capacity expressly for regulation of streamflow for fish and wildlife needs is contained in Section 102 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500)

The Anadromous Fish Conservation Act authorizes the Bureau, Corps, Department of Agriculture, and the states to construct dams and reservoirs solely for the purpose of conserving, protecting, and enhancing anadromous fish if the Secretary of Interior deems this action necessary. The Fish and Wildlife Coordination Act provides a mechanism through which the Fish and Wildlife Service and state fish and game agencies can implement this strategy.

II. Application

This strategy would be applied when construction agencies first begin planning to construct a new dam or enlarge an existing one. No Federal construction agency, except under the Anadromous Fish Conservation Act, is authorized to build a reservoir solely for fish and wildlife purposes; however, the protection or enhancement of fish and wildlife resources could be made a very important project purpose in a multi-purpose project. The FWS and North Dakota Game and Fish Department could promote fish and wildlife conservation to the extent that additional storage capacity specifically to sustain and reserve minimum instream flows would be planned. If during initial project planning these agencies learn that planned storage volumes will be insufficient to provide adequate instream flows, they may recommend a larger dam and reservoir and have the additional costs allocated to fish and wildlife benefits.

When construction agencies enlarge existing reservoir projects, they may do so solely for fish and wildlife purposes or for a number of reasons including the preservation or development of fish and wildlife resources. The fish and game agencies would have to convince the construction agencies of the advisability of enlarging a reservoir to ensure reserving instream flows. Relating a minimum flow regime to the storage capacity necessary to its maintenance may require hydrological data and expertise that is difficult for fish and game interests to acquire. Also, fish and wildlife agencies must convince the construction agencies of the economic benefits of this action. The construction agencies are an important beneficiary of this strategy because they can claim valuable economic benefits in constructing larger dams or enlarging dams for fish and wildlife purposes, possibly improving the economic justification of a reservoir project. Marshalling public opinion can be an important component of this strategy. The FWS and the North Dakota Game and Fish Department can cooperate with conservation organizations and sportsmen's clubs in their negotiations with the construction agencies.

In implementing this strategy, the fish and game agencies must decide which proposed or existing reservoir projects they should investigate or which instream flow and related storage recommendations are most needed. This decision is predicated on the importance of protecting a particular ecological resource and the likelihood that construction agencies will accept and implement the recommendations. The decision-making involved is very related to the application of other instream flow strategies (see strategies entitled State-Federal Interagency Consultations). The implementation of this strategy also depends on decision making by Congress which must authorize the construction or enlargement of dams and reservoirs.

The total costs could be substantial in implementing this strategy. Costs would be incurred as always in conducting stream investigations to justify the inclusion of flow reservations. In addition, however, developing the hydrological basis for increasing the reservoir capacity to sustain the flow reservation will impose significant study cost.

III. Illustration

This strategy has not been implemented in North Dakota; therefore an illustration is used from Washington to demonstrate its utility. The proposed enlargement of Bumping Lake, a reservoir located on the Yakima River, Washington, provides an illustration of this strategy. The Yakima River had supported a major run of salmon, but with the impoundment of the river during the 1930's this run was all but destroyed. The enlargement of Bumping Lake was planned to rehabilitate the salmon run.

Consideration has been given to enlarging Bumping Lake since 1939 when the Roza Diversion was completed. Originally, the planned enlargement was primarily for increased irrigation storage, but enlarging the lake for this purpose could not be justified economically and, therefore, economic benefits had to be derived elsewhere. A complication was that in the mid-1950's the local irrigators were not enthusiastic over the proposed enlargement because they believed the stored water would be too expensive. For these reasons, the BR decided to allocate substantial storage to other purposes. Influenced by the FWS and the recent passage (in 1958) of the Fish and Wildlife Coordination Act, the Bureau proposed a 458,000 acre-foot reservoir with 324,000 acre-feet allocated to fishery enhancement and only 100,000 acre-feet for irrigation. The Washington Department of Game and the BR are presently negotiating over an optimum storage release schedule to provide for the instream flow needs of salmon.

The decision-making involved in implementing this course of action centers around the FWS decision to encourage the BR to enlarge the reservoir for fishery enhancement and the BR's favorable decision largely due to the added economic benefits it could claim to help justify the action. The costs, so far, have been those generally incurred in planning a project modification and have not been substantial. Greater costs may accrue, though, due to delay in construction caused by local opposition. Additional time may be spent in pacifying opposition and in the Congressional authorization process.

Irrigators along the Yakima River oppose allocating a large amount of storage for instream use, and threaten to divert fishery enhancement flows. To guard against this possibility, the Washington Department of Game has suggested that streamflow gages be installed along the river and irrigators be contractually bound to compensate losses to the ecosystem caused by illegal diversion.

IV. Evaluation

To the present, no reservoir west of the Mississippi River has been built solely for fishery purposes under the Anadromous Fish Conservation Act. Federal construction agencies, though, can include fish and wildlife conservation as a project purpose and can provide substantial reservoir storage to sustain flow releases so as to further this purpose. This approach has been more common in recent years, partially because the construction agencies can maximize their benefit claims by adding to the project purposes, and because of recent environmental legislation and increased environmental consciousness.

To successfully implement this strategy, the FWS and North Dakota Game and Fish Department must participate early in the planning process with the construction agency and fully understand the allocation of projected reservoir storage. A basis for coordination with construction agencies is provided by the Fish and Wildlife Coordination Act (see strategies entitled State-Federal Combined Storage and Flow Requests, State-Federal Flow Requests Made Early, and State-Federal Interagency Consultations). Although the construction agencies are under no legal or institutional compulsion to adopt the course of action advocated by the fish and game interests, conservation agencies and their private-sector allies are sometimes convincing in bargaining for greater reservoir storage capacity to ensure reserving instream flows. Their persuasiveness depends a good deal on the scope of their knowledge of the hydrological and biological conditions surrounding a planned or existing dam and reservoir project. Although this strategy has not been implemented in North Dakota, Federal construction agencies and state fish and game agencies are beginning to coordinate more effectively, thus offering increased promise for this strategy. However, in North Dakota, the opportunities for implementing this strategy are limited because there are so few proposed projects.

Once a construction agency commits itself to build a new dam or enlarge an existing one for purposes including the reservation of instream flows, such a commitment is embodied in authorizing legislation passed by Congress. This legislative action is a primary advantage of this strategy because it has the force of law and expresses Congressional intent to protect instream flows.

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WATER RESOURCE MANAGEMENT

STATE WATER RIGHTS RECORDS ANALYZED

I. Identification

This strategy involves locating and analyzing the water rights records for a particular stream as part of the process for securing instream flows. The strategy itself will not ensure an instream flow, but it can be used by the Fish and Wildlife Service and by the North Dakota Game and Fish Department in formulating tactics when negotiating with construction or operating agencies for minimum instream flows. Any interested party could find this strategy useful in deciding what tactics or further strategy would be appropriate to obtain instream flows in a particular stream.

Negotiations between the FWS, North Dakota Game and Fish Department, and the Federal construction agencies take place in accordance with the Fish and Wildlife Coordination Act. This statute is the legal basis of this strategy.

II. Application

North Dakota Game and Fish Department, the FWS or any conservation organization can employ this strategy. It is applicable primarily in two situations: when a concerned party seeks to require minimum instream flows; and when the Game and Fish Department or FWS is bargaining with a Federal construction or operating agency for reservoir releases sufficient to maintain prescribed minimum flows.

Knowledge of the water rights established along a stream reach will aid in selecting the best course of action to reserve instream flows there. For example, if normal streamflows are fully appropriated, a strategy such as filing a junior water right would not be effective, but a strategy such as direct purchase of water rights would be. In contrast, if a stream is not entirely appropriated, an administrative appropriation of instream flow may be applicable.

The North Dakota Game and Fish Department or the FWS can bargain more intelligently with the construction or operating agency for prescribed releases from a reservoir if the extent, location and ownership of water rights established below the dam are known. For instance, if the fishery in a certain stream reach required a minimum 15-cfs instream flow, then sufficient reservoir releases should be prescribed so the 15 cfs will remain after all water rights throughout the stream reach have been exercised. Therefore, knowledge of the existing water rights is essential. With this knowledge, a fish and game agency could tie an instream flow recommendation to an existing downstream water right. This bargaining tactic may be useful as a last resort toward reserving an instream flow where protection of fish and wildlife is not recognized legally as a beneficial use of water.

Water rights are a matter of public record in North Dakota. Records are available from the State Engineer, which include a compilation of all valid water rights. For every stream in the State, a private individual, organization, the Game and Fish Department, or the FWS can ascertain the ownership, amount, the point of diversion, and the date of priority of each water right. The cost of securing this information probably is not great; it is based on copying charges and staff time required to obtain the records.

III. Illustration

This strategy has not been implemented in North Dakota; therefore, an illustration is used from Colorado to demonstrate its utility. Knowledge of a downstream water right enabled a useful tactic in reserving an instream flow in Clear Creek, Colorado, below Georgetown Lake. In May 1969, the FWS recommended a minimum bypass flow of 20 cfs or the inflow to the reservoir, whichever was less. In part, this recommendation was based upon the knowledge of established downstream water rights of 20 cfs. This knowledge was gained through discussions with the State Engineer. A bypass flow of 20 cfs was acceptable to the project licensee, and it was incorporated into the BLM lease of the project. This minimum low flow has usually been maintained, resulting in the preservation of the downstream fishery.

This case illustrates the strategy in a typical situation where the State and Federal fish and game agencies bargain with a Federal permit or consturction agency for a minimum release from a reservoir. It does not, however represent an optimum application of the strategy since the flow recommendation merely uses the water right as a crutch; apparently no analysis of inflows and diversions along the affected stream reach was attempted. The important decision points in applying the strategy in this situation are already institutionalized within the bargaining process. Relatively little cost is involved to gain and apply knowledge of water rights as a tactic in the bargaining process.

IV. Evaluation

Although this strategy has displayed some utility in the past, fish and wildlife interests have only infrequently applied a knowledge of water rights to help ensure instream flows. Furthermore, neither the FWS nor the North Dakota Game and Fish Department has not systematically analyzed all water rights on a particular stream reach when bargaining for reservoir releases.

While some knowledge of downstream water rights could be applied as an instream flow bargaining tactic, it can be argued that flows would be released from a reservoir to satisfy downstream rights regardless of an agreement between the FWS and Federal construction, operating or permit agency. However, it is advantageous to obtain a formal agreement because the downstream rights eventually might be reduced or terminated. An obvious disadvantage of this tactic, though, is that the flow released to satisfy donwstream rights may not be the optimum flow for fish and wildlife purposes.

An advantage of this strategy in North Dakota would be the comprehensiveness and availability of water rights records through the State Engineer's Office. Also, the use of this strategy is not limited to a particular agency or organization; it can be applied by a concerned party to every stream in North Dakota at a reasonable cost. On the other hand, this strategy is ineffective if used by itself. A knowledge of the water rights situation along a certain stream will not result in an instream flow reservation unless this knowledge is used in conjunction with another strategy. The FWS and North Dakota Game and Fish Department believe that this strategy rarely will be applied.

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STATE-FEDERAL FLOW REQUESTS MADE EARLY

I. Identification

To offer timely flow recommendations, the Fish and Wildlife Service and North Dakota Game and Fish Department must be involved in the planning process when Federal agencies, such as the Corps of Engineers, Bureau of Reclamation, and Soil Conservation Service, plan the construction of dams and reservoirs. Recommendations that are timely, i.e., made prior to project construction, have a greater chance of acceptance and implementation than those made during or after construction. The legal basis of this strategy is the Fish and Wildlife Coordination Act of 1958 and the planning procedures adopted by the Federal construction agencies.

II. Application

This strategy is applicable when any Federal construction agency is planninga reservoir, particularly in the earlier phases of planning before design and cost options are foreclosed. Also, when the Federal Energy Regulatory Commission is considering licensing or relicensing a dam and reservoir project, or when the Bureau of Land Management or Forest Service is in the process of issuing a permit to construct a dam on Federal lands, this strategy would apply. The role of these agencies, however, is treated separately (see strategy entitled Federal License and Permit Stipulations). The Bureau of Indian Affairs manages reservoirs, but reservoirs under its management are constructed by the BR.

As provided by the Fish and Wildlife Coordination Act of 1958, the FWS and the North Dakota Game and Fish Department would pursue this strategy. Although it would not be available directly to private parties or public interest organizations, they could play an important role in exerting pressure on the construction agency to accept the fish and wildfife agencies' recommendations.

To apply the strategy, the fish and game agencies must conduct a timely investigation to formulate instream flow recommendations. Application of the strategy is contingent upon prompt notification by the construction agencies of the initiation of project planning. Each construction agency has promulgated procedures to provide for early notification and cooperation with the FWS and the North Dakota Game and Fish Department.

A recent letter from the Commissioner of the BR to the Bureau's Regional Directors ordered them to notify the FWS of the initiation of project planning, and provide the FWS with the opportunity to participate in the formulation and evaluation of project plans and to present reports to the BR, including recommendations relating to fish and wildfife aspects of the project plan. The Corps issued procedures dated 15 August 1973 (to be updated in 1978) which require each District Engineer to provide the Federal and state fish and game agencies with advance information on the studies underway in his planning program; notify them of the initiation of the project investigation; continue liaison, including conferences, throughout the investigation; and obtain the recommendations of the fish and wildlife agencies. The SCS has the least stringent requirements for fish and wildlife agency input. Still, their procedures do encourage the Federal and state fish and game agencies to participate actively in project formulation and to incorporate needed measures in each project to the maximum extent feasible.

Once the Federal and state fish and game agencies have been notified of a project plan and brought into the planning process, they must initiate an investigation to develop timely recommendations. Although conducting investigations and formulating instream flow recommendations are usually time-consuming and expensive tasks, an insistence on timely performance could result in additional costs because of the lack of flexibility available to the field office administrator in allocating time of personnel. Also, earlier efforts can be wasted because preliminary construction plans are often changed or abandoned later on.

III. Illustration

This strategy has not been implemented in North Dakota; therefore, an example from Wyoming illustrates the utility of this strategy. Gray Reef Dam, a feature of the Glendo Unit, is located on the North Platte River 25 miles southwest of Casper in Natrona County, Wyoming. Gray Reef Dam was built in 1961 by the Bureau of Reclamation to regulate the severely fluctuating flow releases caused by power peaking operations at the existing Alcova Reservoir, located 2.5 miles upstream. Observations of the downstream damage caused by these fluctuating releases, as well as public pressure and timely stream studies conducted by the Wyoming Game and Fish Department, the FWS, the City of Casper, and the United States Public Health Service, were instrumental in the decision to build the dam for the protection of the downstream aquatic habitat.

The flow recommendations were formulated in 1956, well in advance of project authorization, as a result of field studies conducted by the Wyoming Game and Fish Department and the FWS. At three stations between Alcova and Casper, the Game and Fish Department studied the effects of releases from Alcova Dam of 0, 300, 800 and 2800 cfs. The key consideration was to determine the flow necessary to establish and maintain a trout fishery. Other parameters examined included stream depth and the composition of the streambed.

The BR accepted the recommendations by constructing Gray Reef Dam to maintain flows in the North Platte River as requested by the Wyoming Game and Fish Department. The operational criteria for Gray Reef Dam include a minimum flow of 330 cfs, with a normal release of more than 500 cfs, and minimal daily fluctuations. However, under a combination of unusual circumstances, releases may fall below 330 cfs if upstream storage reserves are depleted, or if such releases would result in a waste of irrigation water.

According to hydrologic data collected below Gray Reef Dam, the Bureau of Reclamation has generally complied with the minimum flow of 330 cfs. Gray Reef Dam has smoothed the flows released from Alcova Reservoir, significantly improving downstream aquatic and terrestrial habitats. Trout fishing now occurs along the entire reach of river between Gray Reef and Glendo Reservoirs, and thrives in the reach between Gray Reef and the City of Casper.

This illustration demonstrates the effectiveness of early recommendations as well as the importance of political pressure exerted by local organizations, citizens, and elected officials. The timely instream flow recommendation, backed by solid scientific evidence, forced the Bureau to construct Gray Reef Dam so as to adopt the flow regime prescribed for the North Platte River. The only significant cost of implementing this strategy was incurred by the fish and game agencies in conducting the flow studies. However, the cost differences in conducting studies early in the project planning phase probably was negligible.

IV. Evaluation

The FWS and the North Dakota Department of Game and Fish have not applied this strategy in the past, because of little concern over instream flows; however, these agencies indicate that they will consider utilizing this strategy in the future as a result of increased interests in instream flow needs. Furthermore, an Enviro Control study of 109 flow recommendations in nine western states revealed that recommendations made prior to project construction have resulted in greater acceptance than recommendations made during or after construction.

In judging the future effectiveness of the strategy, a number of factors must be considered. The strategy is applicable only when a Federal construction agency is building or modifying a project. Such construction will probably decrease in the future when compared to the spate of construction in the 20 years after World War II. Users of this strategy are limited to the FWS and North Dakota Department of Game and Fish, although private individuals or public interest groups can exert some influence with the construction agencies on behalf of the recommendations by th conservation agencies.

The effectiveness of this strategy depends, in large part, on the construction agencies' close adherence to their own adopted procedures concerning early notification of fish and wildlife agencies on project planning matters. Even if the Federal and state fish and game agencies are informed of a project being planned and their inputs are invited, however, they must decide which projects to investigate in depth where a considerable expenditure of limited personnel and funds would be warranted. In addition, to make timely investigations and recommendations, the state and Federal fish and game agencies would be deprived of some flexibility in budgeting and scheduling. Finally, although a timely flow recommendation enjoys a better chance of acceptance, there is no assurance that such a recommendation will not be rejected on some other basis such as the reasonableness of the flow amounts requested.

Despite these constraints, this strategy does have some definite advantages. Offering flow recommendations is already part of an institutionalized process which has been ongoing for 30 years between the fish and wildlife agencies and the Federal construction agencies. This process has a firm legal basis and should be improved in the future.

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STATE-FEDERAL FLOW REQUESTS MADE SPECIFIC

I. Identification

Specifying instream flow requirements for a particular stream reach or tributary below a dam and reservoir, and monitoring actual instream flows there to ensure that downstream resource values are protected involves detailed on-site investigations by the fish and game agency and subsequent stream gaging. Studies such as transect surveys must be performed at downstream locations selected so as to determine the instream flow needs in specific stream reaches below the dam site. Recommendations would then be offered to the construction agency specifying needed flow releases which, if accepted, would be incorporated into the reservoir's operating criteria. Gaging stations, located within the specific downstream reaches, would determine the sufficiency of the actual releases. The legal or administrative basis of this strategy is the interagency consultative process as provided for by the Fish and Wildlife Coordination Act.

II. Application

This strategy would be applied when the fishery, rookery or other biotic resource within a reach or tributary remotely downstream from a dam and reservoir project is predicted to be, or is already, adversely affected by project flows. Often, a downstream fishery is threatened by low flows even though a required minimum flow is discharged upstream at the dam. Stream diversions and seepage from the stream channel often are responsible for the diminution of the original flow. Also, fishery flows required directly below the dam may be insufficient within a more remote reach or tributary downstream to satisfy localized fish and wildlife habitat requirements. In both cases, the specification of an instream flow requirement at a particular downstream site in addition to, or in place of a project flow release, and the installation of a streamflow gage will facilitate suitable flows in the remote stream reach or tributary. Furthermore, exact requirements supported by careful field investigations will be more persuasive in seeking any flow reservation.

Advocates of this strategy would be the North Dakota Game and Fish Department and the FWS. Public interest groups aware of localized fish and wildlife needs and stream conditions could also participate in applying this strategy. Implementation of the strategy requires that instream flow recommendations be provided to the construction or permit agency during the appropriate planning stage (see strategy entitled State-Federal Flow Requests Made Early). For existing projects, reauthorization or relicensing proceedings or administrative reassignment of reservoir storage could be instituted to reserve needed flows and provide gaging stations (see strategies entitled State-Federal Combined Storage and Flow Requests, Federal License and Permit Stipulations, and Federal Reauthorization of Projects).

The principal costs of applying this strategy would result from detailed instream flow field studies performed by the involved fish and wildlife agencies at downstream sites. Installation and maintenance of streamflow gages in the designated stream reaches will account for additional costs.

III. Illustration

This strategy has not been implemented in North Dakota; therefore, an example from Colorado will serve to illustrate its potential. The Fryingpan-Arkansas Project is a multi-purpose Bureau of Reclamation project involving several structures and impacting a number of streams. The operating principles of the Fryingpan-Arkansas Project, finalized in December 1960, agreed to the protection of recreational and environmental values. The principles were incorporated in the 1962 project authorization. Section 7 of the authorizing document provided for bypass flows below diversion dams and Ruedi Reservoir on the West Slope to protect more than 40 miles of important trout streams along the Fryingpan River and its tributaries and about 30 miles of Roaring Fork River and Hunter Creek. Prescribed bypass flows provided for included the following:

Fryingpan River below Ruedi Dam	Fryingpan River upstream from Ruedi Reservoir above the Confluence with the North Fork
39 cfs, Nov - April	30 cfs, Oct - March
110 cfs, remainder of year	100 cfs, April - July
	150 cfs, May
	200 cfs, May
	75 cfs, August
	65 cfs, September

Chapman Creek	Cunningham Creek
15 cfs, Oct - March	15 cfs, Oct - March
30 cfs, remainder of year	30 cfs, remainder of year

In order to monitor these flows, the BR agreed to install recording gages where needed. As of 1977, new gages have been installed in Chapman and Cunningham Creeks.

The impetus to include these flow regimes in the authorizing document came from recommendations of the FWS which performed detailed field investigations during the late 1950's and early 1960's. The principal decisions in this example are the FWS' decisions to conduct a detailed study, recommend a detailed flow regime and request the installations of gages; and the BR's decisions to accept the FWS recommendations, include them as operating principles in the authorizing document, and to install gages. The primary costs incurred through 1977 have been for the flow studies and gage installation.

IV. Evaluation

Neither the FWS nor the Game and Fish Department have utilized this strategy because climatological and hydrological conditions are so adverse as to render efforts directed towards the establishment of minimum instream flows ineffective. Another major constraint on past use of this strategy in other western states has been the usual inadequacy of instream flow field studies. Historically, flow recommendations were made for the entire reach below the project to a downstream confluence with an identifiable tributary or a main stem river without investigating the requirements of intermediate stream segments. Little attention was paid to the effects of irrigation diversions or return flows. Likewise, consideration of tributary inflows and groundwater recharge was overlooked in the evaluation of flow needs. These variables are receiving greater attention in contemporary flow studies, although the costs associated with such detailed investigations are significantly greater. They are justifiable where high-value fish and wildlife resources are at stake.

An added constraint in the future, should either the FWS or the Game and Fish Department utilize this strategy, will be the costs of the installation and maintenance of streamflow gages which are necessary to fully implement this strategy. Conversations with the United States Geological Survey indicate that an assumption of gaging costs by a construction agency is determined on a case by case basis. In some instances, the construction agency and the fish and game agency will share these costs; otherwise either one or the other will assume the total costs. The cost of installing a gage can range from $15,000 to $40,000; approximate annual operation and maintenance costs can be $4,000.

The future effectiveness of this strategy, should it be implemented in North Dakota, will be enhanced by improved flow study methodologies. The ability to document seasonal instream flow needs for a specific stream reach lends authenticity and credibility to the fish and wildlife agency's bargaining position, thus increasing the likelihood of a flow reservation. On occasion, the ability to quantify the instream contributions of tributary inflows and irrigation return flows could result in a downward adjustment of project releases, thereby preserving water for other beneficial uses.

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STATE-FEDERAL COMBINED STORAGE AND FLOW REQUESTS

I. Identification

When recommending flow releases from proposed or existing reservoir projects, the Fish and Wildlife Service and North Dakota Game and Fish Department should base their recommendations in part on information about storage capacity and projected sales of stored water. The strategy thus embraces simultaneous negotiations for downstream flows and surplus storage capacity in the reservoir sufficient to guarantee the flows. The legal basis of this strategy is the Fish and Wildlife Coordination Act which provides for consultation between State and Federal fish and game interests and the Federal construction agencies.

II. Application

This strategy is applicable in two situations: when a project is being planned by a Federal construction agency and when storage space becomes available in either a planned or existing reservoir. The parties to be involved in this strategy are primarily the FWS and the North Dakota Game and Fish Department. They would apply this strategy in their dealings with Federal construction and operating agencies over planned and existing reservoir projects. Support for this strategy can be generated from local residents, conservancy districts, sportsmen, and environmental organizations.

Most operating reservoirs in the west contain either unobligated, unutilized or underutilized storage. "Unobligated storage" is reservoir storage which is not contractually obligated to water users although it is bound by legislative intent for particular purposes. "Unutilized storage" is contractually obligated for future or deferred use, whereas "underutilized storage" is currently not in use for a particular purpose although contractually obligated for that purpose. Knowledge of unutilized, unobligated and underutilized storage can lead to its interim or permanent allocation for minimum flow releases to satisfy instream flow needs of fish and wildlife. Even without producing an outright allocation, such knowledge can certainly strengthen the bargaining position of fish and wildlife interests seeking instream flow reservations.

Early in the project planning phase, the construction agencies should be requested to provide the FWS and state fish and game agencies with information regarding reservoir storage capacity and the projected sale or other commitment of storage. With this data, the fish and game agencies should be able to determine and negotiate for the amount of storage available to ensure minimum instream flows below the reservoir.

During project operation, some storage may become available -- i.e., unobligated, unutilized or underutilized. The FWS and the state fish and game agencies should have cultivated a cooperative arrangement with the Federal construction agencies, requiring notification when reservoir storage space becomes available. With this information, fish and game agencies may decide to recommend the allocation of reservoir storage to reinforce instream flow recommendations if the downstream fishery warrants this extra measure of protection.

The costs involved in implementing this strategy could vary dramatically, depending on the level of cooperation between the fish and game agencies and the Federal construction and operating agencies. If cooperative agreements under the Fish and Wildlife Coordination Act are successfully implemented (see strategy entitled State-Federal Interagency Consultation) then this strategy would not involve substantial costs. If, however, the FWS and the state fish and game agencies are not routinely furnished with information on planned reservoir capacities and anticipated sale of water storage, or information on available storage in existing reservoirs, then significant costs can be incurred in gathering this information.

III. Illustration

Although this strategy has not been implemented in North Dakota, an illustration from Colorado will serve to demonstrate its strategy utility. The Bureau of Reclamation's Dolores Project (McPhee Dam) was authorized in 1968 as part of the Colorado River Storage Project. McPhee Reservoir, which will have a total capacity of about 381,000 acre-feet, will be operated primarily for irrigation, flood control, municipal and industrial water supply, and recreation. In addition, 800 acre-feet have been allocated to fish and wildlife enhancement. At present, the Dolores River is dewatered at many locations due to channelization and imining and agricultural activities. Therefore, the once excellent trout fishery in the Dolores River has been decimated.

When the project was authorized, the BR planned to release only 4 cfs from McPhee Reservoir for fishery purposes. The FWS and Colorado Division of Wildlfie did not recommend additional flow releases because to significantly improve the marginal downstream fishery would require substantial releases which the BR probably would not agree to. In the early 1970's the BR decided to redesign the project, switching from a gravity surface-irrigation system to a sprinkler system. This change was made for two reasons; the sprinkler system is more water efficient, and the sprinkler system would reduce the salinity of return flows.

This change in project design released 800 acre-feet of reservoir storage for other purposes. This storage could have been used to irrigate more acreage; however, the Conservancy District sponsoring the project realized the benefits of releasing the unobligated storage to re-establish the trout fishery in the river. The BR then asked the FWS and Colorado Division of Wildlife to study the river to determine the flows needed to re-establish the fishery. Using the sag-tape method, FWS and Colorado Division of Wildlife personnel concluded that 78 cfs was an optimum flow, 50 cfs an adequate flow and 20 cfs a survival flow for trout below the proposed dam. Based on these studies the FWS and Colorado Division of Wildlife recommended that the BR release 50 cfs from McPhee Dam. The BR agreed to release 50 cfs during wet years, and 20 cfs during dry years. The terms dry, wet, and normal were not defined.

It is, of course, premature to judge the effectiveness of the prescribed releases since the project has not yet been built. Given the cooperation of construction agency, the costs of implementing this strategy are not too great. The major cost involves the personnel time to conduct the streamflow study.

IV. Evaluation

This strategy has not been applied in North Dakota. However, the Colorado example specifically illustrates how reservoir storage capacity which becomes unobligated can be made available to provide releases for the downstream fishery with the cooperation of the construction agency, the local sponsor, and fish and wildlife interests.

Neither the FWS nor Department of Game and Fish have utilized this strategy for reserving instream flows; however, these agencies have negotiated with federal construction and operating agencies for reservoir storage in order to establish reservoir fisheries. Because of climatological and hydrological conditions in North Dakota, most streams are either dry during the summer or completely frozen in the winter. Therefore, the FWS and Department of Game and Fish try to establish reservoir conservation pools where fish have a much greater chance for survival under such adverse conditions. However, the FWS indicates that it will consider utilizing this strategy at Garrison Dam, as the CE is considering installing additional power generators for peaking power. This will leave the river dewatered for most of the day. According to the FWS, a considerable amount of unobligated water exists in Lake Sakakawea (Garrison Reservoir) which could possibly be used to provide minimum instream flows below the dam.

To a great extent, the future effectiveness of this strategy for new projects depends on successfully implementing other strategies, such as achieving interagency coordination under the Fish and Wildlife Coordination Act (see strategy entitled State-Federal Interagency Consultation) and recommending instream flows early in the planning process (see strategy entitled State-Federal Flow Requests Made Early). It is essential that fish and game agencies actively participate in planning reservoir projects and are kept informed periodically about the availability of storage in already authorized and operating reservoirs.

The strategy's greatest potential exists when the local sponsoring entity and/or the construction agency sees the benefits involved in releasing available storage for fishery purposes and brings fishery agencies into the process of planning reservoir releases. In such instances, the costs of implementing this strategy are not particularly great; however, without cooperation amoung the agencies involved, the costs could be substantial. For example, major cost might be incurred by the fish and wildlife agencies in gathering information which could have been provided by the construction and operating agencies. On the other hand, fish and wildlife interests must justify the economics of allocating any available storage for fish and wildlife purposes.

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ENGINEERING ALTERNATIVES

COORDINATED MULTI-RESERVOIR OPERATIONS

I. Identification

The operations of a multi-reservoir system are regulated through an operations manual which specifies the flows to be released in keeping with the stated purposes of each project. The most common purposes for which multi-reservoir systems are operated are flood control, power production, and irrigation.

Coordinated operations of a multi-reservoir system to sustain or elevate minimum flows would require modification of the operations manual. To accomplish this, authorizing or licensing documents for component projects within the system must be modified to include the necessary releases. Modification of Federal projects may require reauthorization of relicensing proceedings (see strategies entitled Federal Reauthorization of Projects and Federal License entail the preparation of a memorandum of agreement between the operators of the system and the fish and wildlife interests. The legal and administrative basis for this strategy is the agency and interagency regulations and procedures governing those agencies operating reservoir systems. The Fish and Wildlife Coordination Act is the interagency mechanism.

II. Application

This strategy would be applied where a fishery or other aquatic resource below a dam within a multi-reservoir system could be rehabilitated or enhanced by coordinated releases from the system. Parties involved in the implementation of this strategy are likely to be the FWS, the North Dakota Game and Fish Department and the agency or agencies operating the system. In many instances, the system operator will be a single entity, such as the Bureau of Reclamation operating an irrigation project. Where two or more entities such as the Bureau and the Corps would be responsible for project operations, regulation of the system is often mediated using a memorandum of agreement among the agencies involved. Attempts to secure minimum instream flows by balancing system operations would call for drafting a revised memorandum of agreement.

Upon determining stream flows to be insufficient to sustain the fishery below a dam within the reservoir system the interested fish and wildlife agency must examine the operating characteristics of the system, especially its flow regimes and its storage capacities (see strategy entitled State-Federal Combined Storage and Flow Requests). Field studies would be performed to establish the flow needs for the affected stream reach. Given the system characteristics and the instream flow needs, the fish and wildlife interests could propose to alter the operations manual and memorandum of agreement to ensure the recommended flows.

Conducting system-wide flow studies will incur the principal costs during the implementation of the strategy. Additional costs will result from presenting a convincing case to the operating agency toward revising the system operations manual and in reauthorization or relicensing proceedings if these become necessary.

III. Illustration

Missouri River flows are controlled by a system of Federal reservoirs operated for irrigation, flood control, recreation, and power production. Fish and Wildlife is not an authorized project purpose. The following are components of this system: in South Dakota, Oahe, Big Bend, Fort Randall and Gavins Point reservoirs; in North Dakota, Lake Sakakawea (Garrison Dam); and in Montana, Fort Peck Dam. All are operated by the CE out of the Reservoir Control Center in Omaha.

Federal and State fish and wildlife interest believe that since initial fill, the reservoirs have operated in an annual cycle which is not favorable for the development of the fishery resource. The Missouri River Basin Coordination Committee, composed of State water engineers from Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming and representatives of the Corps of Engineers, Bureau of Reclamation, Federal Energy Regulatory Commission, Fish and Wildlife Service, National Weather Service, Geological Survey, Department of Agriculture, and Environmental Protection Agency. This Committee meets biannually to provide input into the operating procedures after the technical aspects of water management are reviewed by the Reservoir Control Center. However, State fishery interests are usually not adequately represented because the State engineer must represent diverse state interests. Also, it is often difficult for the FWS representative to persuade the other Committee Members to support fish and wildlife concerns.

The North Dakota Game and Fish Department has been slightly successful in persuading the CE to manage Lake Sakakawea water level in a manner suitable for northern pike spawning needs. Since approximately 1970, a Game and Fish Department representative has presented annually Departmental concerns on an informal basis to the CE in Omaha, Nebraska. This representative is joined by a State fish and wildlife agency representative from each Montana and South Dakota.

The North Dakota Game and Fish Department has recommended to the CE that water levels be dropped after 1 July to develop vegetation on the shoreline for the following year to provide spawning habitat for northern pike. The management of Lake Sakakawea's water level has marginally benefited northern pike. According to the Game and Fish Department, Garrison Dam and Lake Sakakawea are managed primarily for flood control, which necessitates that the water level remain low during high run-off periods to catch flood flows. Therefore, the operation, during this period, can not be modified significantly in order to meet fish and wildlife needs which require a higher water level for northern pike spawning.

IV. Evaluation

In North Dakota this strategy is being utilized primarily for managing Lake Sakakawea water level in order to provide adequate spawning habitat for northern pike. Negotiations between the Department of Game and Fish and the CE has resulted in slightly better management of water levels. The Department acknowledges severe constraints on the CE for adoption of its recommendations, but the Department will renegotiate annually for improved reservoir management.

A major constraint upon the applicability of this strategy for the system of dams and reservoirs on the Missouri River is that fish and wildlife are not authorized project purposes. For this reason, the FWS and State fish and game agencies have not always been able to convince the CE to modify operations dam and reservoir for the fish and wildlife purposes.

In addition there are a number of cost constraints which will continue to limit the user of this strategy. The fish and game agencies will incur increasing costs for flow studies which increase in complexity and sophistication as entire multi-reservoir systems are analyzed in greater depth. Hydrologic data requirements and required engineering expertise will demand that fish and wildlife interests acquire the analytical skills of the construction agencies in addition to their established biological expertise. These constraints, though do not actually preclude the use of the strategy.

If in the future fish and wildlife become an authorized purpose, the effectiveness of this strategy can be expected to increase. Future utilization of this strategy, however, probably will increase proportionally as the interest in fish and wildlife habitats increases vis-a-vis project purposes such as flood control, irrigation, and power production.

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RESERVOIR SEDIMENT STORAGE RELEASES

I. Identification

Releases of yield from sediment reserve storage for augmenting instream flows involve storage space reassignment by the construction or administering agency. Sediment reserve storage space is the portion of reservoir capacity assigned to sedimentation during the economic life of the project. After a project is constructed, the total amount of storage capacity assigned to a sediment reserve will not be needed for many years. This storage, then, can be made available on a long-term interim basis for fish and wildlife protection and other beneficial uses. Such a reassignment is an administrative decision and does not necessitate Congressional reauthorization of the project. The legal and administrative basis of this strategy is the construction or operating agency's statutory authority and administrative regulations authorizing discretionary modifications of operating projects.

II. Application

This strategy will be discussed only as it applies to existing reservoirs. Applying it to proposed projects involves interagency coordination in the planning process (see strategies entitled State-Federal Flow Requests Made Early, State-Federal Combined Storage and Flow Requests, and State-Federal Interagency Consultations). The strategy may be formulated when a proposed or existing reservoir contains unused sediment reserve storage in the active reservoir space lying above the elevation of the lowest dam outlet. Such storage is normally preserved or else drawn down for beneficial uses such as recreation, irrigation or water supply in compliance with operating restrictions. Either the North Dakota Game and Fish Department, Fish and Wildlife Service, or a conservation group could instigate this strategy if it determines that an available yield from the sediment reserve can rehabilitate or improve the fish and wildlife resources downstream from the existing reservoir. Ultimately, the concerned party must convince the construction or administering agency, such as the Bureau of Reclamation or the Corps of Engineers, to reassign a portion of the unused sediment reserve storage space to fish and wildlife purposes.

Implementation of this strategy involves two basic decision points. After reaching a favorable preliminary determination, the concerned party must decide to solicit the construction or administering agency for action to modify project operation and release some yield from the sediment reserve. Then the agency must decide if the desired modification is feasible and agreeable. Because of the controversy that is often associated with preserving instream flows, the construction or administering agency might seek formal Congressional approval.

The costs of this strategy to fish and wildlife interests are dependent on the detail and availability of information concerning the sediment reserve storage and the fish and wildlife resources downstream from the reservoir. The concerned party will need to know the amount, depletion rate, and current interim uses of the sediment reserve. In addition, the probable effects that increased instream flows, due to a certain yield of the reserve, would have on the fish and wildlife resources would have to be ascertained.

III. Illustration

Although no actual illustration in North Dakota could be identified, an example of a reservoir in Colorado presently suitable to this strategy can be discussed. Completed in 1963, the Bureau of Reclamation's Paonia Project is located on Muddy Creek in west-central Colorado. The stream below Paonia dam supports trout habitat which would improve significantly if added reservoir releases of relatively clear water could be made.

Because of a projected severe sedimentation problem, a substantial portion (44%) of the active storage capacity of Paonia Reservoir was reserved for sediment accumulation. By the end of 50 and 100 years of reservoir operation, the deposition of sediment is estimated to reduce the active reservoir capacity from 18,150 acre-feet to 14,650 and 10,150 acre feet, respectively. The Upper Colorado Regional Office of the Bureau has stated verbally that the 8,000 acre-feet of sediment reserve storage might be available for interim use.

In fact, the Bureau, in a project planning report, stated that surplus sediment reserve storage space in Paonia Reservoir would be available for flood control and incidental releases to maintain fish life in the stream below the dam. However, it was also stated that the North Fork Conservancy District could use the 8,000 acre-feet of reserved capacity for irrigation or other beneficial uses until it is required by the United States for one or more of the specified purposes. The BR's Upper Colorado Office confirmed that the conservancy district is utilizing this storage.

Neither the FWS nor the Colorado Division of Wildlife has attempted to secure increased releases from Paonia Reservoir. However, the proposed Grand Mesa Project, which would require the construction of Electric Mountain Reservoir immediately upstream from Paonia Reservoir, will probably enable both organizations to review the Paonia storage situation. Furthermore, Electric Mountain Reservoir should diminish the sediment deposited in Paonia Reservoir, thus freeing some storage capacity for long-term obligation.

IV. Evaluation

Although this strategy apparently has not been implemented in the past, it does appear to have broad application because most reservoirs, especially the newer ones, contain substantial sediment reserve storage capacity in the active storage space. The strategy's future effectiveness is primarily limited by the ability of Federal, state or private fishery interests to:

- Determine that the available interim yield from sediment reserve storage can significantly improve the associated fish and wildlife resources

- Convince the construction or administering agency to reassign and release the surplus water storage for fish and wildlife benefits.

The Corps and Bureau frequently apply the surplus sediment reserve on an ad hoc basis to purposes such as irrigation and municipal-industrial water supply. The user for these purposes is not charged for this water. Thus, it is likely that users of this supplemental water would lobby against its reassignment to fish and wildlife protection.

Neither the FWS nor the Department of Game and Fish has utilized this strategy for reserving instream flows; however, these agencies have negotiated with federal operating agencies for conservation pools. Because of adverse climatological and hydrological conditions in North Dakota, most streams are either dry during the summer or completely frozen during the winter. Therefore, the FWS and Game and Fish Department try to establish reservoir conservation pools where fish have a much greater chance for survival under such adverse conditions.

Attempting to ensure releases of sediment reserves requires an examination of existing project records and operations. Because FWS and state fish and game agencies' field offices direct their efforts towards proposed projects, implementing this strategy would involve an expenditure of personnel time normally not provided for from funds transferred by construction agencies. This is a further constraint upon the future effectiveness of this strategy. Probably the best opportunity to implement the strategy would arise when modifying an existing project or planning a project would have an impact upon existing reservoir operations.

The FWS and Department of Game and Fish indicate that as result of increased attention to instream flow needs in recent years, it might utilize this strategy in the future. Possible future utilization of this strategy in North Dakota, however, would probably remain limited in recognition of the trade-offs between establishment of reservoir conservation pools and provision of instream flows, which are more susceptible to adverse hydrological and climatological conditions.

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STREAM CHANNELS TO CONVEY STORED WATER

I. Identification

In operating dam and reservoir projects to convey stored water to downstream users, water is either released into the stream and diverted at a point downstream or conveyed directly from the reservoir via a canal or conduit. This strategy is an attempt to have proposed reservoir projects designed without direct conveyance systems at the reservoir so that water can be released into the stream to benefit fish and wildlife, then diverted as far downstream as may be feasible. This strategy can be effectuated through the consultative process stipulated by the Fish and Wildlife Coordination Act (FWCA)

II. Application

As provided by the Fish and Wildlife Coordination Act, the Fish and Wildlife Service and the North Dakota Game and Fish Department conduct investigations of sites proposed for reservoir projects, then formulate and present recommendations to the construction agencies concerning fish and wildlife preservation or enhancement. If, as part of their investigations, the FWS and State agencies determine that a reservoir conveyance system may damage the downstream fishery or other biotic resources, they might recommend that such a system be modified. They could draw support from local interest groups and users of the resource to give greater force to such a recommendation.

In conducting their project investigations, the FWS and North Dakota Game and Fish Department are provided with information by the sponsoring agencies. Any information regarding proposed conveyance system should be sought at the outset because a recommendation to modify or not build a conveyance system must be made early in the planning process. Because detailed engineering and planning are involved, construction agencies and permit applicants would resist a change of plans after spending time and money to develop them. Once the construction begins, a sponsoring agency almost assuredly would not stop construction solely on the recommendation of fish and wildlife interests.

III. Illustration

This strategy has not implemented in North Dakota, therefore, a site in Wyoming presently under consideration for the application of this strategy demonstrates the potential utility of the strategy. The proposed Middle Fork Reservoir on the Powder River serves as an illustration of this strategy's potential. In 1974, the Powder River Reservoir Corporation filed for a BLM right-of-way permit to flood certain Federally owned lands for the construction of Middle Fork Reservoir. The proposed reservoir will supply water for coal-related industrial development and, to a lesser extent, irrigation. As proposed, water would be conveyed from the reservoir through a canal system to meet these demands.

In 1976 at the request of the BLM, the FWS and Wyoming Game and Fish Department responded to the proposal. After joint field surveys were conducted, a report was submitted by the FWS to the BLM on March 5, 1976. The FWS recommended a minimum instantaneous release of 35 to 40 cfs during the non-irrigation seasons to devvelop a good-quality tailwater and downstream fishery. The recommended flow would approximate the historical average winter flow. Without these release the existing fishery would be seriously curtailed.

The FWS recommended that the only practical way to realize a winter release of this magnitude without destroying the industrial water purpose of the proposed project would be to convey the industrial water down the existing Middle Fork channel to a downstream point of diversion 4.7 miles below the proposed dam. The FWS had indicated that the proposed modification would not result in additional construction.

In late 1977 the planned construction of Middle Fork Reservoir was delayed until the Department of the Interior's solicitor could determine if a right-of-way permit could be granted by the BLM, because the Powder River Reservoir Corporation had not adequately specified the use of the reservoir storage. If a permit was to be granted, the Secretary of the Interior might require that the permittee provide for storage releases sufficient to meet instream flow needs below the dam. It was expected that a decision would be made on the right-of-way permit sometime in February 1978.

IV. Evaluation

Although this strategy has not yet been implemented in North Dakota, it does offer potential for protecting fisheries downstream from reservoirs. Several severe constraints, though, must be weighed in judging future effectiveness. Reservoir conveyance systems usually occur as a function of project purpose or engineering necessity. Single-purpose power and municipal supply projects most frequently divert water directly from the reservoir. Most off-stream appropriators seek gravity flow delivery by conduit or canal to minimize pumping costs; sound engineering judgment and ordinary cost saving considerations may demand direct conveyance from the reservoir. Since conveyance structures are costly, construction agencies and permit applicants normally would maximize the use of the stream channel, subject to trade-off cost factors such as high energy use to deliver water by pumping instead of gravity. As evidenced by the Middle Fork Reservoir case, the burden will be on the FWS and the North Dakota Game and Fish Department to justify their recommendation from a cost and engineering standpoint, taking the value of the threatened resource into account in a cost/benefit analysis.

Perhaps the greatest perceived limitation to this strategy's utilization in North Dakota by the FWS and the Game and Fish Department is the strategy's limited applicability. In a semi-arid state, water conveyance via the stream channel is inefficient in comparison to conveyance via lined canals. It is believed that water loss through seepage and evaporation would be much greater when water is conveyed in the stream channel. However, the strategy would be applicable when earthen canals are being considered, because their efficiency is equivalent to conveyance by the stream channel.

Investigating a proposed project and formulating recommendations, pursuant to the FWCA, usually requires substantial time and money. Implementing this particular strategy may incur significant additional costs in performing detailed studies to defend a recommendation to modify the reservoir conveyance system. In the case of the Middle Fork Reservoir, the required engineering expertise and additional study cost was atypically low because the cost trade-offs were easily derived.

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